

**THIS FACILITY IS IN FORMAL
LITIGATION.**

**PLEASE DO NOT FILE ANY
DOCUMENTS IN THIS FILE.**

**PLEASE GIVE ALL DOCUMENTS
TO CAROL UTICK SO THAT THEY
CAN BE LOGGED INTO THE DATA
BASE AND THEN PUT INTO THE
FORMAL LITIGATION FILE.**

THANK YOU.

DATE 3-12-99



Montana Department of
ENVIRONMENTAL QUALITY

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.state.mt.us

MAILED
10-20-03 Jh

Judy Martz, Governor

October 17, 2003

Mr. William Spoja
P.O. Box 882
Lewistown, MT 59457-0882

Dear Mr. Spoja:

The Solid Waste Program received the July, 2003 groundwater sampling results on October 14, 2003. It was assigned to Patricia Potts for review. I anticipate that you will receive a response from Ms. Potts within 90 days.

If you have any questions on the review status or the results, please contact Ms. Potts directly at 406-444-0538, or by email at ppotts@state.mt.us. If you have any other issues or questions, please contact me at 406-444-5345, or at rithompson@state.mt.us.

Sincerely

Rick Thompson

Rick Thompson, Supervisor
Waste Management Section
Community Services Bureau

Sincerely,

DANSCHE & ASSOCIATES, INC.

Bruce L. Stigman

Bruce L. Stigman
Project Hydrogeologist

MAILED



DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

File: ~~XXXXXX~~
Fergus Co
Sanitation Inc. # 291
grd wtr (corresp)
2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604
TELEPHONE (406) 449-8627
FAX (406) 449-8631

May 12, 1997

RECEIVED

MAY 13 1997

MONTEANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

Ms. Pat Potts
MDEQ Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Ms. Potts:

Here is a tentative schedule for our Spring, 1997 ground-water monitoring:

Beaverhead, Madison--May 14 or 16;

Sanitation, Glendive, Colstrip, Hardin, Stillwater--May 27-30;

Sheridan Co., Daniels, Wolf Point, Malta, Unified, Shelby (w/ approval)--June 9-13.

Since some of these facilities are difficult to access during inclement weather, there may be last-minute changes in the itinerary. If you intend to accompany us on any of these trips, please be certain to contact us to confirm the schedule. In the meanwhile, if you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAMSCHEN & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

DAVIS & ASSOCIATES, INC.

Consulting Engineers

May 12, 1957

RECEIVED

MAY 13 1957

Mr. E. B. Burt
MORCO Water Management Division
P.O. Box 20000
Houston, TX 77250-0001

Dear Mr. Burt:

There is a tentative schedule for our Spring, 1957, meeting which is as follows:

Registration - May 14 to 15
General Session - May 16 to 17
Special Session - May 18 to 19
Dinner - May 20 (optional) - June 1-12

Since some of these facilities are difficult to secure during the summer months, there may be a change in the schedule. It is our intent to announce this as early as possible. We would be pleased to confirm the schedule to you as soon as it is available. If you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAVIS & ASSOCIATES, INC.

Walter L. Stevens
Project Management

1-5

File: FERGUS Co.
Sanitation Inc. #291
grd wtr (correct)

DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMITTING & COMPLIANCE DIVISION
SOLID WASTE PROGRAM
MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Metzger Building

SANITATION, INC.
P.O. BOX 692

LEWISTOWN, MT 59457

538-9241 1-800-362-1329

Phone: (406) 538-4321
Fax: (406) 538-1274

PO Box 200901
Helena, MT 59601

RECEIVED

APR 15 1997

MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU

April 14, 1997

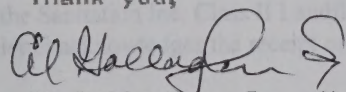
Department of Environmental Quality
Permitting and Compliance Division
Solid Waste Program
PO Box 200901
Helena, MT 59620-0901

Attention: Pat Potts, Environmental Specialist

Pat,

Sorry for the delay on the monitoring well locks. All wells had locks installed in December. Locks are in place and wells are locked at all times.

Thank you,



Al Gallagher, Sr., Manager
Sanitation, Inc.

The Fall/October/November 1996 ground water monitoring event conducted at Sanitation Inc. wells received on February 23, 1997 by the Program. This is the ground water monitoring report.

ARM 17.50.706(1) and (2). The ground water monitoring report clearly stated that there is an insufficient amount of data available to do the statistical analyses at the present time. The Program estimated that at a semi-annual monitoring frequency, it will take Sanitation Inc. two and a half more years to accumulate a total of eight data points, the minimum data set for performing these well comparisons. This seems like an inordinately amount of time, since the rules strongly suggest that water sampling will be necessary if there is not a sufficient amount of data available.

With regard to the final fate of ground water monitoring well SIMW-1 and assuming Sanitation Inc. continues to pursue monitoring this shallow aquifer, the Program would prefer to observe the water level (if any) in this well for at least a full year before making any decisions as to its final disposition. Having piezometer SIP-2 nearby has temporarily eased the need for an additional well in the shallow network of wells in order to comply with the minimum requirement of one back ground and two down-gradient wells (see ARM 17.50.706(1) and (2)).

Sanitation, Inc.
P.O. Box 402
Lewistown, PA 17042
717-394-1121

RECEIVED

APR 12 1997

COMMUNITY SERVICES BUREAU
DEPT. OF ENVIRONMENTAL AFFAIRS

Department of Environmental Quality
Permitting and Compliance Division
Solid Waste Program
PO Box 60000
Harrisburg, PA 17106-0000

Retention Pond Water, Environmental Specialist

Re:

Sorry for the delay in the monitoring well logs. All wells had
logs written in December. Logs are in place and wells are
logged at all times.

Thank you.

W. J. [Signature]
W. J. [Signature], Sr., Manager
Sanitation, Inc.

DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMITTING & COMPLIANCE DIVISION

SOLID WASTE PROGRAM

MARC RACICOT, GOVERNOR

Metcalf Building



STATE OF MONTANA

Phone: (406)444-4323

Fax: (406)444-1374

PO Box 200901

Helena, MT 59620-0901

April 9, 1997

William A. Spoja, Jr.

P.O. Box 692

Lewistown, Montana 59457

**RE: SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY -
LICENSE NO. 291**

**RECEIPT OF THE FALL/OCTOBER 22, 1996 AND NOVEMBER 26, 1996 GROUND
WATER MONITORING RESULTS**

Dear Mr. Spoja:

The results from the Fall/October-November 1996 ground water monitoring event conducted at the Sanitation Inc. Class II Landfill were received on February 25, 1997 by the Program. This letter acknowledges the receipt of the ground water monitoring report.

This submittal meets the regulatory requirements set forth in Title 17, Chapter 50, Subchapter 7, Administrative Rules of Montana (ARM), except for the statistical data evaluation requirement in ARM 17.50.708(14) and (14)(b). The ground water monitoring report clearly stated that there is an insufficient amount of data available at this site to perform statistical analyses at the present time. The Program estimated that at a semi-annual sampling frequency, it will take Sanitation Inc. two and a half more years to accumulate a total of eight data points, the minimum data set for performing intra well comparisons. This seems like an inordinate amount of time, since the rules strongly suggest increased sampling will be necessary if there is not a sufficient amount of data available.

With regard to the final fate of ground water monitoring well SIMW-1 and assuming Sanitation Inc. continues to pursue monitoring this shallow aquifer, the Program would prefer to observe the water level (if any) in this well for at least a full year before making any decisions as to its final disposition. Having piezometer SIP-2 nearby has temporarily eased the need for an additional well in this shallow network of wells in order to comply with the minimum requirement of one background and two downgradient wells [see ARM 17.50.706(1) and (2)].



1700 2nd Street
Helena, MT 59601

Phone: (406) 444-4343
Fax: (406) 444-7174

April 1, 1997

William A. Spivey, Jr.
P.O. Box 2000
Lawrence, Montana 59043

RE: PERMIT APPLICATION FOR CLASS II LANDFILL, PERMIT NO. 1700-000001

PERMIT NO. 1700-000001
PERMIT FOR THE CONSTRUCTION AND OPERATION OF A CLASS II LANDFILL
WATER MANAGEMENT PLAN

Dear Mr. Spivey:

The permit for the proposed landfill was issued on February 1, 1997, and was valid until February 1, 1998. The permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality.

The permit for the proposed landfill was issued on February 1, 1997, and was valid until February 1, 1998. The permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality. The permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality.

The permit for the proposed landfill was issued on February 1, 1997, and was valid until February 1, 1998. The permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality. The permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality, and the permit was issued under the authority of the Department of Environmental Quality.

William A. Spoja, Jr.

Page 2

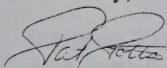
April 9, 1997

On my visit to the site in October 1996, I noticed the monitoring wells had no locks on them. Please note that according to ARM 17.50.707(8),

"All ground water monitoring wells shall have caps to prevent contaminants from entering the monitoring device. All monitoring wells shall have protective outer casings and locking lids. The lids shall be kept locked. The department may require additional protective devices such as rings of brightly colored posts around any monitoring device."

This lock requirement would also apply to piezometer SIP-2, especially if it is intended to be used as an alternative ground water sampling point, either now or in the future. Locks protect the owner/operator from discovering and having to be responsible for contaminants detected in a monitoring well(s) for which the landfill may not be the source.

Sincerely,



Pat Potts

Environmental Specialist

cc: Allen Gallagher, Sanitation Inc., P.O. Box 692, Lewistown, MT 59457
Roger Godfrey, R.S., Central Montana Health District, 1306 1st Street West, Roundup, MT 59072
Damschen & Associates, Inc., P.O. Box 4817, Helena, MT 59604

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File: Fergus Co./Sanitation Inc. #291/grd wtr (corresp)

On the date of the above captioned letter, I advised the following facts to the person to whom the letter was addressed:

All ground water monitoring wells which have been installed in the area of the proposed development, including the wells which are being installed in the area of the proposed development, are being installed in the area of the proposed development. The wells which are being installed in the area of the proposed development are being installed in the area of the proposed development.

The following information would be given to the person to whom the letter was addressed: The wells which are being installed in the area of the proposed development are being installed in the area of the proposed development. The wells which are being installed in the area of the proposed development are being installed in the area of the proposed development.

Very truly yours,

William A. Spiller, Jr.

President

Environmental Services, Inc.

Environmental Services, Inc., 100 West 10th Street, Suite 100, New York, New York 10011

Page 1 of 1. Environmental Services, Inc. is a subsidiary of Environmental Services, Inc.

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Environmental Services, Inc. is a subsidiary of Environmental Services, Inc.

DEPARTMENT OF
ENVIRONMENTAL QUALITY

PERMITTING & COMPLIANCE DIVISION
SOLID WASTE MANAGEMENT PROGRAM
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

November 13, 1996

William A. Spoja, Jr.
P.O. box 692
Lewistown, Montana 59457

RE: SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY - LICENSE NO. 291
GROUND WATER MONITORING

Dear Mr. Spoja:

It appears that the ground water-bearing unit currently being monitored at this site is a localized sand zone, partially controlled by seasonal recharge. Evidence of the limiting nature of this water-bearing sand zone can be observed in the existing ground water monitoring network presently in place at this site.

Monitoring well SIMW-1, the most upgradient well of the three existing wells, did not produce a satisfactory volume of water for collecting the required full suite of samples for the Spring/June 1996 event (VOC analysis only), and no sample could be collected for the Fall/October 1996 event. Trace levels of volatile organic compounds (VOCs) have been detected in the previous samples collected from SIMW-1. However, because SIMW-1 has had an insufficient volume of water available for any sample collection this Fall (1996), the Program strongly recommends that SIP-2, a 1.25-inch diameter hand-slotted PVC piezometer, be sampled in place of SIMW-1 as part of the Fall 1996 ground water monitoring event.

Once the analytical results are available from this supplementary sampling location, the actual integrity of this alternate sampling point may be more effectively evaluated for future sample collection.

Sincerely,

A handwritten signature in cursive script, reading "F. Patrick Crowley".

F. Patrick Crowley
Solid Waste Regulatory Lead

cc: Roger Godfrey, R.S., central Montana Health District, 1306 1st Street West, Roundup, MT 59072
Allen Gallagher, Sanitation Inc., P.O. Box 692, Lewistown, MT 59457
Damschen & Associates, Inc., P.O. Box 4817, Helena, MT 59604

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file: Fergus Co./Sanitation Inc./grd wtr (corresp)



DAMSCHE & ASSOCIATES, INC.

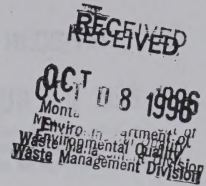
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

October 7, 1996

Ms. Pat Potts
MDEQ Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901



Dear Ms. Potts:

This letter is to notify you that we intend to sample the ground-water monitoring wells at the following facilities on the dates noted:

- Twin Bridges landfill, Wednesday, October 9, 1996;
- Sanitation, Inc., Lewistown, Tuesday, October 22, 1996;
- Glendive landfill, Wednesday, October 23, 1996;
- both Rosebud County landfills, October 24, 1996; and
- Stillwater County landfill, October 25, 1996.

We have still not received a response to our August 26, 1996 request for a meeting at the Sanitation, Inc. landfill. We are still concerned that your problem with the installation of a background well has not been addressed, and we propose that October 22, 1996 would be a good time for us to meet at the facility. At that time we would like to review the hydrogeology of the facility so we are sure that you have all of the requisite information.

We look forward to seeing you later this month. However, if you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAMSCHE & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

CC: Ralph Hamler, Madison County Sanitarian
William Spoya, Sanitation, Inc.
Gary Zuroff, City of Glendive
Mike Holzwarth, Rosebud County Solid Waste District
Scott Waltner, Stillwater County



DAMSCHE & ASSOCIATES, INC.
CONSULTING ENGINEERS

File: Fergus Co.
Sanitation Inc. #291
grd wtr (corresp)

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

August 26, 1996

RECEIVED

AUG 30 1996

Montana Department of
Environmental Quality
Waste Management Division

Ms. Pat Potts
MDEQ Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Ms. Potts:

We received your August 21, 1996 response to our submittal of the Spring, 1996 ground-water monitoring results. We feel that it is important to address the issues you have brought up.

Item 1. We feel that our statements and explanation regarding this item are contradictory to your stated policy for the collection of baseline data. In at least one meeting you stated that the Department of Environmental Quality has allowed facilities to collect baseline data on the basis of the semi-annual monitoring events. This policy has been applied to all of our landfill clientele to date. We are confused regarding why you have changed this policy for this facility.

We realize that only one sampling event was conducted in 1995. Please remember, however, that no ground-water monitoring wells were to be installed originally, and that the wells were only completed in August, 1995. It is also significant that the total discharge of ground water through this saturated zone is very small and the volatile organic compounds detected to date are all well below the practical detection limit. Similar situations have arisen at several other landfills with no resultant acceleration of the sampling schedule.

Item 2. The issue of background wells has clearly been dealt with at this facility, and we suggest that you review our submittals on this subject. It is physically impossible to install a background well at this facility, and we defended all of the data and evaluations leading to this conclusion in our January, 1996 submittal to the Department. In addition, there are no other wells in this particular saturated zone from which to establish background, and the Department has expressed dissatisfaction in the past regarding the use of unrelated aquifers for background data collection. The statistical problems arising from such procedures have been widely discussed in many literature sources and, more important, in discussions with Montana regulators and consultants. This notwithstanding, we will explain the situation again. Please refer to the maps included with the January, 1995, April, 1995 and January, 1996 submittals.

Surface and subsurface data show the rock strata to dip to the north-northwest, and the

hydraulic gradient also dips in this general direction. The recharge area for the shallow ground water includes the landfill itself, the exposed slope that bounds the south side of the landfill, and a pasture to the east and northeast of the facility. This pasture is underlain by black clay shale that is in direct contact on the west (the eastern boundary of the landfill) with arenaceous exposures. Three holes have been drilled to adequate depths to determine if ground water occurs in the central and southern portions of the landfill. Methane monitoring well SIG-3 was collared at the same elevation as the bottom of the saturated zone detected in piezometer SIP-2. Piezometer SIP-2 is upgradient of monitoring wells SIMW-1 and -2, and no water was discovered approximately 350 feet to the south of this area in test boring SI-5. The quantities of water found in each of the monitoring wells and piezometers is consistent with the concept of the landfill lying within or very closely proximal to a recharge zone. This is also supported by the observation that there was less water in SIP-2 and SIMW-1 this spring than late last year when water was flowing on the surface in the pasture east of the facility. Thus, the surface geology, all of the sub-surface findings, and the behavior of the ground-water point toward the scenario that we have described. We fail to understand where you would propose that a background well be installed and why you think there is water in such a location. Please be assured that if a background well could have been located anywhere else on this site, we would have installed it; this makes most aspects of any ground-water monitoring program easier to manage, and we are not attempting to make things more difficult for ourselves and our client.

Item 3. We do not agree with your recommendation to install an additional well. To clarify the reasoning for this recommendation, we request that you explain to us the mechanisms you envision that would allow mounding to take place beneath this facility. Further, we do not agree with your assessment that the southern portion of the landfill has not been adequately characterized. The ground-water situation, or, rather, the absence of ground water in this area, is a straightforward hydrological scenario, and we feel that further characterization would be a waste of resources for our client.

We are apparently unable to adequately explain the ground water system to you, even though you stated in your April 21, 1995 letter to Mr. Gallagher that our April, 1995 submittal "explains the ground water situation at the landfill fairly clearly." To clear up this situation, we strongly recommend that you accompany us on a detailed tour of the site, including a walk-through, measurements of the wells and piezometers, and an examination of all of the cuttings taken from the drilling to date. This will allow us the opportunity to explain our understanding of the hydrogeology in order that a fully informed decision can be made regarding the necessity for further investigations. We ask that you telephone us at your earliest convenience to make arrangements for this field trip.

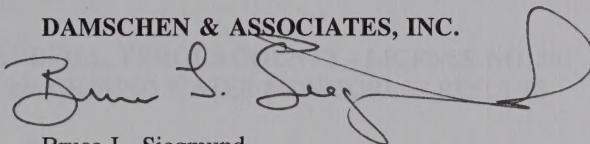
We realize that the monitoring program has not proceeded as we all would have liked. You have acknowledged in your letters to our client that the entire concept of the monitoring program had to be changed as a result of the discovery of ground water at this facility. The discovery of this shallow ground water required additional drilling and geological investigations that went far beyond the initial scope of work. It is also a reality that a different driller might well have missed this ground water entirely, and any number of other geologists may have dismissed the ground water at this site as insignificant. This would have

resulted in the installation of a completely ineffective ground-water protection program. Instead, Mr. Spoya has directed us to work to our maximum effort to install the most effective monitoring system possible with the existing geological conditions.

All of the work performed at the Sanitation, Inc. landfill to date has been conducted in good faith using the guidance provided by Department's stated policies. We have provided the Department with all of the information we can obtain, and have worked with due diligence to assure the protection of the ground water in the vicinity of the Sanitation, Inc. landfill. Please be assured that we will continue to do so. We do feel, however, that it is in everyone's best interest to meet at the site before any more testing or drilling is conducted to ensure that all parties are in agreement regarding what the next step should be. We look forward to hearing from you in the very near future.

Sincerely,

DAMSCHEN & ASSOCIATES, INC.

A handwritten signature in dark ink, appearing to read "Bruce L. Siegmund", with a large, stylized loop at the end of the signature.

Bruce L. Siegmund
Project Hydrogeologist

CC: Pat Crowley, DEQ
William Spoya, Sanitation, Inc.

DEPARTMENT OF
ENVIRONMENTAL QUALITY
PERMITTING & COMPLIANCE DIVISION
SOLID WASTE MANAGEMENT PROGRAM
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

August 21, 1996

William A. Spoja, Jr.
P.O. Box 692
Lewistown, Montana 59457

RE: SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY - LICENSE NO. 291
RECEIPT OF THE SPRING/JUNE 10, 1996 GROUND WATER MONITORING RESULTS

Dear Mr. Spoja:

Results from the Spring 1996 semi-annual Detection ground water monitoring event conducted on June 10, 1996 at the Sanitation Inc. Class II Landfill were received by the Program on August 19, 1996. Analytical results were similar to those from the previous sampling event (August 1995). The low levels of several VOCs detected from that sampling event re-appeared in the June 1996 samples. Please note, the following deficiencies were found in the ground water monitoring data submittal:

1. A statistical analysis was not provided with the data from the June 1996 ground water monitoring event because the facility has an insufficient number of sampling events from which to develop an appropriate statistical methodology. The Administrative Rules of Montana (ARM) do not provide an unlimited amount of time to acquire an adequate number of samples from the monitoring wells for the purpose of performing the required statistical analyses. According to ARM 17.50.708(14), a statistical analysis is required for each parameter and constituent found in Detection Monitoring.

ARM 17.50.708(11) requires that the number of samples be appropriate for the statistical method(s) chosen. For example, in Assessment Monitoring according to ARM 17.50.710(1)(a)(iv), in order to establish a statistical baseline for a newly detected constituent(s), it is necessary to collect a minimum of four independent samples. Sampling independence, according to the "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities" interim guidance document (February 1989), can be determined based on flow rate. U.S. EPA Region VIII has suggested that samples collected at monthly intervals would be independent in virtually all cases.

DEPARTMENT OF
ENVIRONMENTAL QUALITY
WASTE MANAGEMENT DIVISION
SOLID WASTE MANAGEMENT PROGRAM
09/11/1-1-30
FAX 847/274-4141

William A. Spoja, Jr.

Page 2

August 20, 1996

STATE OF MONTANA

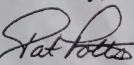
The Program strongly encourages Sanitation Inc. to conduct a sufficient number of sampling events in a more timely manner, so that the required statistical analyses can be conducted for the Fall 1996 data report submittal. This request now has increased urgency based on the fact that Sanitation Inc. conducted only one sampling event for the calendar year of 1995.

2. As mentioned in a letter from the Program dated January 26, 1996, a background monitoring well(s) is still needed at this site [see ARM 17.50.706(1)].

3. The Program is concerned that the overall effectiveness of the existing monitoring well network and its ability to detect the migration of hazardous constituents from the most recently active and the closed waste disposal areas [see ARM 17.50.706(2)] may be limited. With mounding of the ground water being observed at several landfills in the state, the ground water flow direction south of the landfill has not been determined. The Program will require that at least one additional well should be drilled in this area (i.e., south side of the landfill).

The Program encourages Sanitation Inc. to fulfill the required ground water monitoring regulations in a prompt fashion, so that ground water compliance will not be an issue with regard to final closure approval.

Sincerely,



Pat Potts

Environmental Specialist

cc: Roger Godfrey, R.S., Central Montana Health District, 1306 1st Street West, Roundup, MT 59072
Allen Gallagher, Jr. Sanitation Inc., P.O. Box 692, Lewistown, MT 59457
Damschen & Associates, Inc. P.O. Box 4817, Helena, MT 59604

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file: Fergus Co./Sanitation Inc./grd wtr (corresp)

The program strongly encourages Sanitation Inc. to conduct a sufficient number of monitoring events in a more timely manner, so that the required statistical analysis can be conducted for the Fall 1995 data report submission. This request now has increased urgency based on the fact that Sanitation Inc. conducted only one sampling event for the calendar year of 1995.

2. It is noted in a letter from the program dated January 26, 1995, a background monitoring well(s) is still needed at this site (see ARM 17.30.706(1)).

It is noted that the overall effectiveness of the existing monitoring well network may be reduced to detect the migration of hazardous constituents from the most recently installed ground water disposal sites (see ARM 17.30.706(2)) may be limited. This is due to the ground water being observed at several locations in the area the ground water flow direction south of the landfill has not been determined. The program will require that at least one additional well should be drilled in this area (see ARM 17.30.706(1)).

The program is requesting Sanitation Inc. to fulfill the required ground water monitoring requirements by the end of the calendar year, so that ground water compliance will not be an issue with regard to the 1995 data report submission.

Very truly yours,
[Signature]
[Name]
[Title]
[Address]
[City, State, Zip]

cc: [Name]
[Address]
[City, State, Zip]

DEPARTMENT OF
ENVIRONMENTAL QUALITY
WASTE MANAGEMENT DIVISION
SOLID WASTE MANAGEMENT PROGRAM
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

April 25, 1996

William A. Spoja, Jr.
P.O. Box 692
Lewistown, Montana 59457

RE: SANITATION INC. CLASS II LANDFILL, FERGUS CO. #291
SEMI-ANNUAL GROUND WATER MONITORING, AND MONITORING/SAMPLING
DURING CLOSURE AND POST CLOSURE PERIODS

Dear Mr. Spoja:

This letter is to remind you that the Program has not received any ground water monitoring results since the August 1995 sampling event. According to ARM 17.50.701(1)(c)(i), Sanitation Inc. was required to have originally commenced sampling the ground water at this facility by October 9, 1994.

In January 1995, a plan for vadose zone fluid detection was reviewed by the program in lieu of a possible no migration petition approval because quantities of shallow ground water were initially demonstrated to be limited at this site. In April 1995, complications arose when sufficient quantities of relatively shallow ground water were encountered during drilling of the wells for the alternative monitoring plan. Ground water monitoring wells were then determined to be necessary to adequately monitor the quality of the ground water at this site.

Three wells (and 2 piezometers) were installed and sampled in August 1995. Several volatile organic compounds (VOCs) were detected at low concentrations (i.e., below practical quantitation limits) in two of the three monitoring wells.

A minimum of four independent (no more frequent than monthly) sampling events are generally necessary to perform most approved statistical analyses of the analytical results [see ARM 17.50.708(11)]. All facilities required to monitor the quality of the ground water must sample no less than semi-annually (2 times per year) [ARM 17.50.708(4)(a)]. Even if the August 1995 sampling event was considered to be a Fall 1995 event, the Spring 1996 sampling event should have been conducted no later than March 1996. Has this event been conducted? If so, please submit the results as soon as they are available.

DEPARTMENT OF
ENVIRONMENTAL QUALITY

Waste Management Division
Solid Waste Program
402/434-1570

DATE: 11/15/96

William A. Spoja, Jr.

Page 2

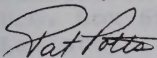
April 25, 1996

STATE OF MONTANA

With regard to anticipated closure of this facility, it will still be necessary to sample the ground water at this facility during closure and for 30 years of post closure care [ARM 17.50.721(1) and (2)].

If you have any questions concerning ground water monitoring/sampling requirements at this facility, please give me a call.

Sincerely,



Pat Potts

Environmental Specialist

cc: Roger Godfrey, R.S., Central Montana Health District, 1306 1st Street West, Roundup,
MT 59072

Allen Gallagher, Jr., Sanitation Inc., P.O. Box 692, Lewistown, MT 59457

Damschen and Associates, Inc., P.O. Box 4817, Helena, MT 59604

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Fergus Co

DEPARTMENT OF
ENVIRONMENTAL QUALITY

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE: 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING: PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

January 26, 1996

Allen Gallagher
Sanitation Inc.
P.O. Box 692
Lewistown, Montana 59457

RE: **SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY -
LICENSE NO. 291
RECEIPT OF GROUND WATER MONITORING DATA**

Dear Mr. Gallagher:

The Department received the data on the recently (August 1995) installed ground water monitoring wells at the Sanitation Inc. Class II Landfill on January 8, 1996. The three monitoring wells that were recently completed at this facility were also sampled for the entire list of Table 1 parameters and constituents, as well as dichlorodifluoromethane.

The analytical results indicated the presence of volatile organic compounds (VOCs) in the ground water in two of the three monitoring wells. Although these levels were below the practical quantitation limits (PQLs), freons and chlorinated solvents are not naturally occurring in the ground water. These chemical constituents have been determined to be commonly associated with leaky landfills.

According to ARM 16.14.704(1) recodified as ARM 17.50.708(1), at least one background monitoring well is required at all facilities. This monitoring well(s) must be located so as to monitor the quality of ground water representative of the ground water passing the relevant point of compliance that has not been affected by leakage from the landfill unit.

In reviewing the analytical results from the August 1995 sampling event, the natural quality of the ground water at monitoring well SIMW-1 has been impacted by chemical constituents common to landfill leachate (i.e., freons and a chlorinated solvent). Also, the location of this monitoring well is hydraulically downgradient from historical waste disposal areas associated with the landfill. Therefore, the Program encourages Sanitation Inc. to install at least one background monitoring well to determine the natural

Sanitation Inc.
Page 2
January 26, 1996

quality of the background/upgradient ground water that has not been affected by leakage from the landfill.

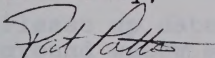
An alternative that may be used to determine the background water quality according to ARM 16.14.706(1)(a) and ARM 16.14.706(10) recodified as ARM 17.50.708(1)(a) and ARM 17.50.708(10) respectively, might be, sampling other wells that will provide an indication of background quality that is representative or more representative than that provided by the upgradient wells.

Once background water quality is established, a sufficient number of independent samples will need to be collected [see ARM 16.14.706(11) recodified as ARM 17.50.708(11)] to perform the appropriate statistical analyses required according to ARM 16.14.706(12) recodified as ARM 17.50.708(12), to determine whether or not there is a statistically significant increase over background values for each parameter or constituent required [see ARM 16.14.706(14) recodified as ARM 17.50.708(14)]. Please note that according to ARM 16.14.706(13)(e) recodified as ARM 17.50.708(13)(e), the statistical method shall account for data below the limit of detection.

The Program encourages Sanitation Inc. to work through each step of the regulatory ladder to finalize an efficient and effective ground water monitoring network at this site, that will continue to be applicable for the remaining active life and post closure period of this facility. As the regulations are addressed, the Program intends to work with Sanitation Inc. to facilitate their particular needs as questions arise. Please give us a call if you have any questions.

For the present time, it is important for Sanitation Inc. and their technical consultant to determine the most applicable option in establishing natural background water quality in the area of this site. Following this step, additional sampling of the wells will be necessary. This will provide an adequate amount of data from which statistics may be performed.

Sincerely,



Pat Potts
Environmental Specialist

cc: William A. Spoja, Jr., P.O. Box 692, Lewistown, MT 59457
Roger Godfrey, R.S., Central Montana Health District, 712 W. Main,
Lewistown, MT 59457
Damschen and Associates, Inc., P.O. Box 4817, Helena, MT 59604

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DEPARTMENT OF
ENVIRONMENTAL QUALITY

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

December 5, 1995

Allen Gallagher
Sanitation Inc.
P.O. Box 692
Lewistown, Montana 59457

RE: SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY -
LICENSE NO. 291
GROUND WATER MONITORING REQUIREMENTS

Dear Mr. Gallagher:

The Department has not received any recent information indicating whether the ground water monitoring well installations, that were approved in a letter from the Department dated April 21, 1995, have been installed at the Sanitation Inc. Class II Landfill. According to the response to Mr. Ed Thamke's inspection report dated June 5, 1995 questioning the status of the ground water monitoring well installations, Damschen and Associates, Inc. confirmed that the owner/operator had approved the installation and sampling of these proposed monitoring wells. However, as of June 30, 1995 (date of Damschen's letter) no ground water monitoring wells had been installed, nor had any water quality data been collected at this site.

Please note, the boring log and well completion data required to be submitted to the Department [see ARM 16.14.705(11) recodified as ARM 17.50.707(11)] has not been received, if these wells were installed. In addition to the monitoring well completion information, the Department would expect the ground water sampling analytical results to be forthcoming soon after well installation and development.

Please up date the Department on the current status of the required ground water monitoring well system for your facility.

Sincerely,

A handwritten signature in cursive script, appearing to read "Pat Potts".

Pat Potts
Environmental Specialist

Sanitation Inc.
Page 2
December 5, 1995

cc: William A. Spoja, Jr., P.O. Box 692, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health District, 712 W.
Main, Lewistown, MT 59457

Damschen and Associates, Inc., P.O. Box 4817, Helena, MT 59604

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DAMSCHE & ASSOCIATES, INC.
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

August 17, 1995

Mr. Edward Thamke
MDEQ Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Thamke:

Yesterday we completed the installation of the ground-water monitoring system at the Sanitation, Inc. landfill in Lewistown, Montana. We also replaced the casing caps on two of the methane monitoring wells. A more complete report regarding the geology, hydrology and water quality will be submitted to the Department upon receipt of the water sample analyses.

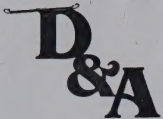
Sincerely,

DAMSCHE & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

RECEIVED

AUG 18 1995
Montana Department of
Environmental Quality
Waste Management Division



DAMSCHE & ASSOCIATES, INC.
CONSULTING ENGINEERS

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Sanitation Inc.
grd wtr (corr)

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

RECEIVED

JUL 03 1995

Montana Department of
Environmental Quality
Waste Management Division

June 30, 1995

Ed Thamke
DHES
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Ed:

On behalf of Sanitation Inc. I am writing this letter to respond to your inspection report dated June 5, 1995. In your report you requested a time schedule to correct the violations which you stated in your report. My client's response is as follows:

Groundwater Monitoring

* Sanitation, Inc. has authorized our firm to proceed with the installation of the groundwater monitoring wells as per the approved plan. At the time of installation, samples will also be collected and sent to the lab. *

Methane Monitoring

The methane wells have been tested for the first two quarters of 1995 and will be tested again this summer at the same time the groundwater wells will be tested. Previous test results were recently submitted to your office.

Run-on/Run-off Controls

We have received the "go-ahead" from Sanitation Inc. to prepare the closure/operation plan for the landfill. This plan will include the design of the detention pond.

Special Waste Handling

Sanitation Inc. is planning to accept petroleum contaminated soil upon your Department's approval at the landfill. The plan for receiving and testing this material will be included in the operation plan to be submitted to you.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

Ed Thamke

DHES

Waste Management Division

Page 2

Hazardous Waste Screening

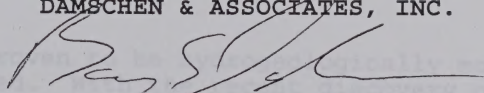
I have forwarded samples of waste screening plans that we have developed for other clients to Sanitation, Inc. They will review these and develop their own waste screening plan and send it to you for your review and approval.

If everything goes perfect, we are planning to have all the items described herein completed and submitted to your office by the end of July, 1995. Due to possible weather constraints and the availability of drillers, however, we are requesting a 90 day time frame in which to complete this work.

If you have questions or comments please do not hesitate to call me. We look forward to hearing from you on our work plan and schedule.

Yours very truly,

DAMSCHEN & ASSOCIATES, INC.



Barry E. Damschen, P.E.
Project Manager

BED/kmh

cc: Sanitation Inc.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

April 21, 1995

Allen Gallagher
Sanitation Inc.
P.O. Box 692
Lewistown, Montana 59457

RE: **SANITATION INC. CLASS II LANDFILL, FERGUS COUNTY -
LICENSE NO. 291**
APPROVAL FOR GROUND WATER MONITORING WELL INSTALLATIONS

Dear Mr. Gallagher:

The Sanitation Inc. site has proven to be hydrogeologically more complex than originally expected. With the recent discovery of shallow ground water at this site, it is clear that monitoring wells will be necessary to determine the quality of the shallow ground water through the active life, as well as the closure and post-closure care period at this facility.

The Supplementary Hydrogeological and Soils Study, Sanitation Inc. Landfill, Lewistown, MT, dated April 1995, explains the shallow ground water situation at the landfill site fairly clearly. Sheet 1 of the study has no legend or key; however, the stippled rectangles are apparently proposed locations that will be drilled to determine the extent of the shallow ground water zone. Monitoring wells will need to be installed for ground water sampling purposes, according to ARM 16.14.704 and 16.14.705. If an actual hydraulically up gradient location cannot be found where ground water volumes are great enough to sample, the Department will consider alternative methodologies for possible alternate comparisons to natural background ground water conditions.

The Department appreciates Sanitation Inc.'s recent efforts to better understand the hydrogeology at their facility, and the diligent work of the technical personnel involved. The Department approves the new plan to drill several shallow holes to better

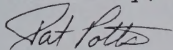
Sanitation Inc.

Page 2

April 21, 1995

define and effectively monitor the quality of the shallow ground water at this site.

Sincerely,



Pat Potts

Environmental Specialist

cc: William A. Spoja, Jr., P.O. Box 692, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health Officer District,
712 W. Main, Lewistown, MT 59457

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DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

Fergus Co
Sanitation Inc
grd wtr (corr)

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

April 6, 1995

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APR 07 1995

Montana Department of Health
and Environmental Sciences
Waste Management Division

Ms. Pat Potts
MDHES Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Ms. Potts:

On behalf of the owner and operator of the Sanitation, Inc. landfill in Lewistown, Montana, we are pleased to submit the results of the drilling undertaken at the facility in January, 1995. Included with the report of findings and completed hydrogeological evaluation is a revised Work Plan for monitoring the potential migration of any leachate that may be generated at the facility. We are all interested in implementing a monitoring system as soon as possible, so we would greatly appreciate your reviewing this document at your earliest convenience. Additional drilling will be required at the site, so some lead time for arranging the appropriate contractors will be necessary.

If you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAMSCHEN & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

Enc

cc: Sanitation Inc.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

January 23, 1995

Allen Gallagher
Sanitation, Inc.
P.O. Box 692
Lewistown, Montana 59457

RE: **SANITATION, INC. CLASS II LANDFILL, FERGUS COUNTY -
LICENSE NO. 291**
REVIEW AND COMMENTS ON THE WORK PLAN FOR THE SANITATION,
INC. LANDFILL, LEWISTOWN, MONTANA, JANUARY 1995.

Dear Mr. Gallagher:

The Department has reviewed the Work Plan for vadose zone monitoring submitted by Damschen and Associates, Inc. for the Sanitation, Inc. Class II Landfill. Ground water monitoring was required to be initiated by October 9, 1994 at all Class II solid waste landfills located less than one mile from a drinking water intake (surface or subsurface) in the State of Montana [see ARM 16.14.701(1)(c)(i)]. Because insufficient quantities of free ground water/aquifers have been found in the upper 100 to 200 feet below the ground surface in this area, the Department has agreed to approve the concept of an on-going no-migration demonstration approach for this facility using vadose zone monitoring [see ARM 16.14.714(5)].

However, the Department must make it clear that if this approach is unsuccessful in providing adequate data to evaluate leachate generation and possible migration beneath the site, Sanitation, Inc. may still be required to install monitoring wells at the site. The Department remains cautious in approving this proposed procedure, as sampling of the moisture/ground water will not be possible with this type of monitoring approach.

The Department appreciates the opportunity to review new technologies that may be more applicable in certain situations than the standard ground water monitoring network methodology. We will await the results of the initial field investigations, well installations, and moisture tests. Please note that this information will need to be completed and submitted to the Department in a much more timely manner than by January, 1996 as indicated on page 11 of the Work Plan. The Department will require Sanitation, Inc. to have an operational monitoring system installed

Sanitation, Inc.
Page 2
January 23, 1995

DANISCH & ASSOCIATES, INC.
CONSULTING ENGINEERS

2070 11TH AVENUE • SUITE 11
P.O. BOX 4617 • LEWISTOWN, MT 59404
TELEPHONE (406) 549-8227
FAX (406) 549-8241

January 3, 1995

and initial testing results available within 90 days from the date that the first vadose zone monitoring wells are installed.

The Department sincerely hopes that this alternative methodology proposed to monitor the soil moisture/ground water is successful. If the Department can be of any further assistance, please give me a call.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

cc: William A. Spoja, Jr., P.O. Box 692, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health District, 712 W.
Main, Lewistown, MT 59457

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file: Fergus County/Sanitation, Inc./grd wtr (corr)

Sincerely,

DANISCH & ASSOCIATES, INC.

Bruce J. Sigmond
Bruce J. Sigmond
Project Hydrogeologist

CC: Pat Potts, Waste Management Division
Wet Spills, Sanitation, Inc.

Enclosure

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JAN 24 1995

Waste Management Division
Sanitation, Inc.
Wet Spills



DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

January 3, 1995

Mr. Pat Crowley
MDHES
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Crowley:

Attached please find the Work Plan for the Sanitation, Inc. landfill east of Lewistown, Montana. As we discussed in our meeting earlier this month, we have a drill rig currently on site and will begin drilling as soon as weather allows. We are concerned, however, that there are two locations that may not be accessible to the drill rig. Roads may have to be cut to these locations, and frozen ground may preclude roadbuilding at this time. While we do not want to make an additional trip to the facility for cost reasons, we may simply have to wait until the ground thaws to gain access to these locations.

We are confident that the methane monitoring wells can be installed with no problem, regardless of the weather conditions. Likewise, most of the exploratory drilling can be completed without any problems anticipated.

We will keep you informed as to the progress of the work at this facility. We appreciate the openness with which the Department has approached the monitoring aspects of this site. If you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAMSCHEN & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

CC: Pat Potts, Waste Management Division
Wm. Spoja, Sanitation, Inc.

Enclosure

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JAN 04 1995

Montana Department of Health
and Environmental Services
Waste Management Division

File: FERGUS Co
Sanitation Inc
grd wtr (con)



DAMSCHEN & ASSOCIATES, INC.
CONSULTING ENGINEERS

New File: Sanitation in Inc
Fergus Co
ground water
2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

January 3, 1995

Mr. Pat Crowley
MDHES
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Crowley:

Attached please find the Work Plan for the Sanitation, Inc. landfill east of Lewistown, Montana. As we discussed in our meeting earlier this month, we have a drill rig currently on site and will begin drilling as soon as weather allows. We are concerned, however, that there are two locations that may not be accessible to the drill rig. Roads may have to be cut to these locations, and frozen ground may preclude roadbuilding at this time. While we do not want to make an additional trip to the facility for cost reasons, we may simply have to wait until the ground thaws to gain access to these locations.

We are confident that the methane monitoring wells can be installed with no problem, regardless of the weather conditions. Likewise, most of the exploratory drilling can be completed without any problems anticipated.

We will keep you informed as to the progress of the work at this facility. We appreciate the openness with which the Department has approached the monitoring aspects of this site. If you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

DAMSCHEN & ASSOCIATES, INC.

Bruce L. Siegmund
Project Hydrogeologist

CC: Pat Potts, Waste Management Division
Wm. Spoja, Sanitation, Inc.
Enclosure

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JAN 04 1995

Montana Department of Health
and Environmental Sciences
Waste Management Division

 DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Solid and Hazardous Waste Bureau
Solid Waste Program

MARC RACICOT, GOVERNOR 406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION 836 Front Street
Helena, Montana

MAILING ADDRESS: Cogswell Building
Helena, MT 59620

April 29, 1994

William A. Spoja, Jr.
Sanitation Inc.
P.O. Box 882
Lewistown, Montana 59457

RE: **SANITATION, INC. CLASS II LANDFILL, FERGUS COUNTY - LICENSE NO. 291**
GROUND WATER MONITORING REQUIREMENTS

Dear Mr. Spoja:

On October 9, 1993, the revised Administrative Rules of Montana (ARM), Title 16, Chapter 14, Subchapter 7 became effective. The original Solid Waste **Ground Water Monitoring** regulations have now been revised to incorporate the basic aspects of 40 Code of Federal Regulations (CFR) Part 258, essential to obtaining State regulatory approval and authority for the Solid Waste Program. Through these revised regulations, the scope of the Ground Water Monitoring Regulations has been expanded to include those Class II solid waste facilities that serve a geographic area of less than 5,000 people. In essence, all Class II solid waste disposal facilities will be required to monitor the quality of the ground water beneath and emanating from the waste management unit boundaries of a solid waste facility, unless the particular solid waste facility has received an approved small community exemption [ARM 16.14.506(16)] and has no evidence of ground water contamination [ARM 16.14.506(16)(a)].

Ground water monitoring compliance deadlines have been determined according to the facility's proximity to the nearest drinking water intake (surface or subsurface). According to the information supplied on the most recent Solid Waste Annual License Renewal Application, the Sanitation, Inc. Landfill facility is reportedly a 0.50 mile(s) from the nearest drinking water intake. Therefore, **Sanitation, Inc. will be required to be in compliance and have commenced ground water monitoring by October 9, 1994, according to ARM 16.14.701(2)(c)(i).**

April 29, 1994

In order to comply with this deadline date, several prerequisites are necessary. They are as follows:

- * Submit a **Work Plan** within **90 calendar days from the date of this letter** [ARM 16.14.703(1)(c)(ii)(A)], and receive approval from the Department for implementation of a hydrogeologic investigation of the site according to the approved Work Plan.

[Please note that in the case of Sanitation, Inc. the time-frames such as the 90-day deadline for the Work Plan, followed by the 180-day soils and hydrogeologic investigation and reporting period, will need to be accelerated as much as possible in order to comply with the October 1994 ground water monitoring compliance date. The Department is aware of this problem and will try to approve all required submittals in a very timely manner.]

This **Work Plan** should address hydrogeologic requirements as outlined in ARM 16.14.703. These requirements may be generally organized into 11 basic categories [ARM 16.14.703(1)(a)]:

- (i) Regional and facility geologic and hydrogeologic characteristics,
- (ii) Topographic features,
- (iii) Site-specific description/characterization and appropriate stratigraphic correlation of lithologic and hydrogeologic units which overlie the uppermost aquifer,
- (iv) Structural geology and hydrogeologic cross sections,
- (v) Determine the direction and rate of ground water flow in the uppermost ground water-bearing zone/aquifer, and the vertical rate of migration,
- (vi) Possible man-made influences that may affect the hydrogeology of the site,
- (vii) A hydrogeologic report including the following data on all wells to be used for monitoring the quality of the ground water, and wells and/or piezometers used for measurement of the water level elevations: well descriptions, construction facts, location, elevation, well log, sampling history and operational history,
- (viii) Quality of the ground water,

April 29, 1994

(ix) Supporting calculations and explanations for ground water flow direction(s) and velocities, hydraulic conductivity, transmissivity, porosity, permeability, and estimated leachate transport times,

(x) Characterization of soil and rock units above the water table,

(xi) An appendix to the report including references used, additional data, supplemental calculations, material specifications, well construction specifications [required Ground Water Monitoring Well Completion Forms, see ARM 16.14.705(11)], and other appropriate information,

Please refer directly to the specific rule citation above for a more detailed explanation of each particular requirement.

- * A **Hydrogeologic and Soils Report** incorporating and documenting at a minimum, all of the above information is required to be submitted within **180 calendar days after the Work Plan is approved by the Department** [ARM 16.14.703(1)(c)(ii)(C)].

In conjunction with the site hydrogeologic field investigation work and item (v) [direction and rate of ground water flow] above, drilling, installation and completion of **ground water monitoring wells** are required to be installed at the site (ARM 16.14.704) for purposes of monitoring the quality of the ground water beneath and emanating from the disposal areas, as well as for measuring the water level elevations in each well to determine the direction and rate of ground water flow. A Solid Waste disposal facility is required to have, at a minimum, the following wells:

ARM 16.14.704(1) **Two background wells**, unless it can be demonstrated to the Department's satisfaction that a single well will suffice for the statistical test method chosen for ARM 16.14.706(12), and

ARM 16.14.704(2) **At least 2 downgradient** ground water monitoring wells. The Department may require additional wells based on the size of the waste disposal unit(s), the nature and characteristics of the subsurface and the uppermost ground water-bearing zone/aquifer, and the unsaturated sediments above the uppermost ground water.

Based on the available local hydrogeology and the extent of the field investigation work conducted on-site, sufficient hydrogeologic data should now exist on the site to be able to complete an adequate ground water monitoring network which will need to be approved by the Department. This **approved network of ground water monitoring wells** will be required to be **sampled on a semi-annual basis** for the ARM 16.14.706 **Table 1** list of parameters/constituents. The

Sanitation, Inc. Class II Landfill

Page 4

April 29, 1994

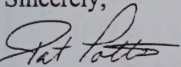
Department also recommends the inclusion of dichlorodifluoromethane to the Table 1 sampling list.

NOTE: Dichlorodifluoromethane is not a required volatile organic compound (VOC) in ARM 16.14.706 Table 1. The Department recommends that dichlorodifluoromethane be analyzed along with the other required VOCs in Table 1. There is normally no additional charge for the analysis of this constituent, if the laboratory is notified in advance. The physical and chemical properties of dichlorodifluoromethane (CFC-12) will allow this constituent to move at a rate similar to that of the natural rate of the ground water flow. It has been determined that detected levels of dichlorodifluoromethane in ground water may be helpful in delineating the more rapidly moving/advancing hydraulically down gradient edge of a possible leachate plume.

The current ARM Title 16, Chapter 14, Subchapter 7 provides an outline delineating approved practices, procedures and protocols for preliminary site hydrogeologic investigations, ground water monitoring well installations and completions, and ground water sampling requirements. According to ARM 16.14.705(6)(a) through (c), it is required that a hydrogeologist or other qualified person be present during certain phases and technical activities associated with the installation/completion and sampling of the facility ground water monitoring wells and investigative borings. A statement of qualifications (resume) for the technical person or persons conducting hydrogeologic work on-site will need to be submitted to the Department for review and for the files, if they have not already done so previously.

If you have any questions, please give me a call.

Sincerely,



Pat Potts

Environmental Specialist

cc: Fergus County Commissioners, 712 W. Main Street, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health Department, Lewistown, MT 59457

path: sw\fergussa.grd

file: Fergus Co./Sanitation, Inc./grd wtr (compliance letter)

December 12, 1979

Mr. Duane Robertson, Chief
Solid Waste Management Bureau
1400 Eleventh Avenue, Suite A
Helena, Montana 59601

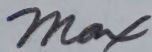
Dear Duane:

Enclosed is my report describing hydrological conditions at two solid waste disposal sites near Lewistown, Montana. Results of this examination indicate portions of each site contain ground-water within 10 feet of the ground surface. Other portions of each of these sites, however, appear to meet all hydrological criteria for Class II sites.

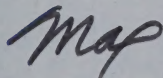
I have delayed sending this report until I received site sketch maps. I have not as yet received these so I have developed rough sketch maps based on my site visits. Good plan maps are still needed for both these sites. I have some photos of the sites that I will send to you when they are processed.

Please call me if you have any questions on this report or need any further information.

Yours truly,



Maxwell K. Botz, P.E.
Hydrologist-Engineer



MKB:bd
Enclosure

RECEIVED

DEC 17 1979

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
SOLID WASTE SECTION

Ground Water Development

Mining Hydrology

Geotechnical Investigation

Water Quality

Water Resources Engineering

Water Rights

HYDROMETRICS

HYDROLOGICAL ASSESSMENT OF
TWO SOLID WASTE DISPOSAL SITES NEAR
LEWISTOWN, MONTANA

for

Mr. Duane Robertson, Chief
Solid Waste Management Bureau
1400 Eleventh Avenue, Suite A
Helena, Montana 59601

by

HYDROMETRICS
1300 Cedar Street
Helena, Montana 59601
406/443-4150

December 12, 1979

HYDROLOGICAL ASSESSMENT OF
TWO SOLID WASTE DISPOSAL SITES NEAR
LEWISTOWN, MONTANA

In November 1979, at the request of the Montana Solid Waste Management Bureau, two solid waste disposal sites near Lewistown, Montana were examined. Objectives of this examination were to appraise hydrological conditions at these sites and to determine if they meet all requirements for Class II solid waste disposal sites under the rules of the Montana Solid Waste Management Bureau. For solid waste disposal at Class II sites, Montana rules (Section 16-2.14(8)-S14315) require that groundwater be a depth of at least 10 feet beneath the bottom of the proposed landfill site and that permeability of the material underlying the site be less than 10^{-3} (2.83 ft/day). The primary focus of these site examinations was to determine existing groundwater conditions.

Field trips were taken to Lewistown to examine these solid waste sites on November 7, 8, 10 and 21, 1979.

CADOTTE DISPOSAL SITE

The Cadotte disposal site is approximately 2 miles east of Lewistown, Montana along Highway 87 (T15N,R18E,Section 7). This site is on a very small south-facing ephemeral tributary to Boyd Creek. This drainage is bowl shaped and is about 300 feet in diameter. Low hills surround the site and, in past years, portions of the bottom of the drainage have been used for disposal of solid wastes. It was reported by the site owner, Mr. Don H. Cadotte, that the site had a deeply incised stream channel which was backfilled with solid wastes. He also reported that the upper end of this drainage was used to bury wastes by

excavating deep trenches, filling with waste, and covering with soil.

A total of four backhoe pits were dug at this site (Figure 1) to determine subsurface geological conditions and depth to groundwater. The site appears to be underlain by dark-colored marine shales of the Colorado Formation of Cretaceous geological age. Overlying the shale bedrock is a thin mantle of light brown, stony, clayey silt.

The first test pit was dug on November 7, 1979 near the southern end of the proposed disposal site about 90 feet north of the old railroad center line. (See Figure 1.) This area is underlain by approximately three feet of compacted solid waste consisting primarily of wood and metal products. Underlying the solid waste material is a very firm, dark-colored, moist to very moist claystone. A blocky shale typical of the Colorado Formation and harder than the claystone was encountered at a depth of 7 feet. This first test pit was completed at a total depth of 13 feet in a very firm, dense, gray shale. The material was very moist but did not appear to contain free water. Approximately 10 minutes after completion of the test pit, groundwater began seeping into the trench at a depth of an estimated $12\frac{1}{2}$ -13 feet. Early the next morning (November 8, 1979), groundwater in Test Pit 1 was approximately 10 feet below the ground surface.

Test Pit 2 was dug on November 7, 1979 approximately 125 feet southwest of Test Pit 1 and near the upstream toe of the abandoned railroad embankment (Figure 1). Test Pit 2 contains approximately 2 feet of solid wastes and is underlain by very firm, blocky, dark-colored shale. At a depth of 10 feet, a slight amount of groundwater seeped into the hole after completion of excavation. On the following day (November 8, 1979), the water surface in Test Pit 2 was 8 feet below the ground surface.

After finding groundwater in the lower end of the proposed disposal site, two additional test pits were dug in the north-west portion of the site (Figure 1). Both these pits were dug to a depth of over 10 feet into a shale bedrock consisting of very firm, blocky shale which varied in color from brown to gray. These test holes were dug under the supervision of Bob Childers, sanitarian from Lewistown, on November 8, 1979. On November 10, 1979 no water was observed in these holes by M. K. Botz of Hydrometrics.

Bedrock at the Cadotte site is estimated to have a low permeability (less than 10^{-3} cm/sec) and appears to be transmitting a small quantity of groundwater southward toward Boyd Creek. This groundwater probably is derived from local infiltration on the disposal site and possibly from a small drainage north of the disposal site. The small quantity of groundwater from the Cadotte disposal area is not expected to impact groundwater resources except on and very near the site. It is estimated that the quantity of groundwater moving through the site is very small and chances of any off-site impacts are remote.

Approximately one-quarter mile north of the Cadotte site is a much larger east-west trending drainage. This drainage contained a small quantity of ponded water and several cattail patches, indicating continued wet conditions. This wet area appeared to be higher in elevation than the lower portion of the Cadotte site, and could be a source of groundwater recharge to the site.

The major stream drainage in the area is an estimated 400-600 feet south of the Cadotte site, and has a relatively flat ground surface and is underlain by alluvium of unknown thickness. There is one residence south of the site. This residence uses a drilled well to supply household water. The well is in a 10-12 foot deep pit which was constructed using 48-inch CMP

(corrugated metal pipe). The CMP contains a few slots near the ground surface. Near the bottom of the CMP is the well and pressure tank. The well seal has been modified to accommodate the drop pipe and pump wire. Neither the well nor the CMP is sealed to prevent entrance of surface water or debris.

THE MR. M DISPOSAL SITE

This site is approximately 3.1 miles east of Lewistown along Highway 87 in Township 15N, Range 19E, Section 8 and is owned by Mr. Marvin Mintyala. This active site has been used for waste disposal for a number of years. The site is in a small, south facing drainage basin entirely underlain by shales, claystones and sandstones of the Kootenai Formation of Cretaceous geological age. These bedrock strata are nearly horizontal and are reddish brown, yellow, cream and purple, which is typical of this formation. Bedrock is overlain by a thin layer of light brown-colored, silty soil.

A total of 5 test pits were dug on the property by a backhoe to determine subsurface geological and groundwater conditions. A sketch map of the property and backhoe pit locations is shown on Figure 2.

Test Pits 1, 2 and 3 were dug the week of November 19, 1979 under the supervision of Bob Childers. On November 21, 1979 these three test pits were examined and two additional pits were dug. (See Figure 2 for test pit locations.) All test pits were dug to a depth of at least 10 feet and encountered claystone, sandstone and shales of the Kootenai Formation. Generally, the bedrock was weathered near the ground surface and became harder with depth and was relatively fresh in the pit bottoms. Although the soils were very moist in all pits, Test Pit 2 was the only pit that contained groundwater. On November 21, 1979 groundwater was present in Test Pit 2 at

a depth of 8.5 feet below the ground surface.

Bedrock at the Mr. M site as determined from test pits and examination of surficial geology has a very low permeability (less than 10^{-3} cm/sec) and will transmit very little groundwater. Test Pit 5 is about 40 feet from a small pond. The bottom of the pit was several feet lower than the water surface in the pond, yet no groundwater seeped into the test pit during or after excavation. This indicates a very low bedrock permeability. The disposal area is drained by small ephemeral streams that flow water only during spring snowmelt or during periods of intense precipitation. There are two small ponds on the disposal site (Figure 2). As reported by the operator, the largest pond normally contains waters from runoff but dried up by late September or early October 1979. According to the operator, the largest pond overflowed during snowmelt from the severe winter of 1978. However, it normally does not overflow.

The smaller pond contained water in November 1979 and is about 20 feet north of the larger pond. This pond appears to be supplied by water from a small seep near its north end (Figure 2). Several small seeps around the area of buried wastes (Figure 2) are reported by the operator to be caused by horizontal movement of water from the layered, buried wastes. The top of each layer apparently is impervious and causes infiltrating water to migrate laterally to the edge of the buried wastes to form small seeps.

Groundwater present in Test Pit 2 probably is related to water ponded at this site and probably does not indicate a regional groundwater system. This waste disposal site appears to have no impact on groundwater resources.

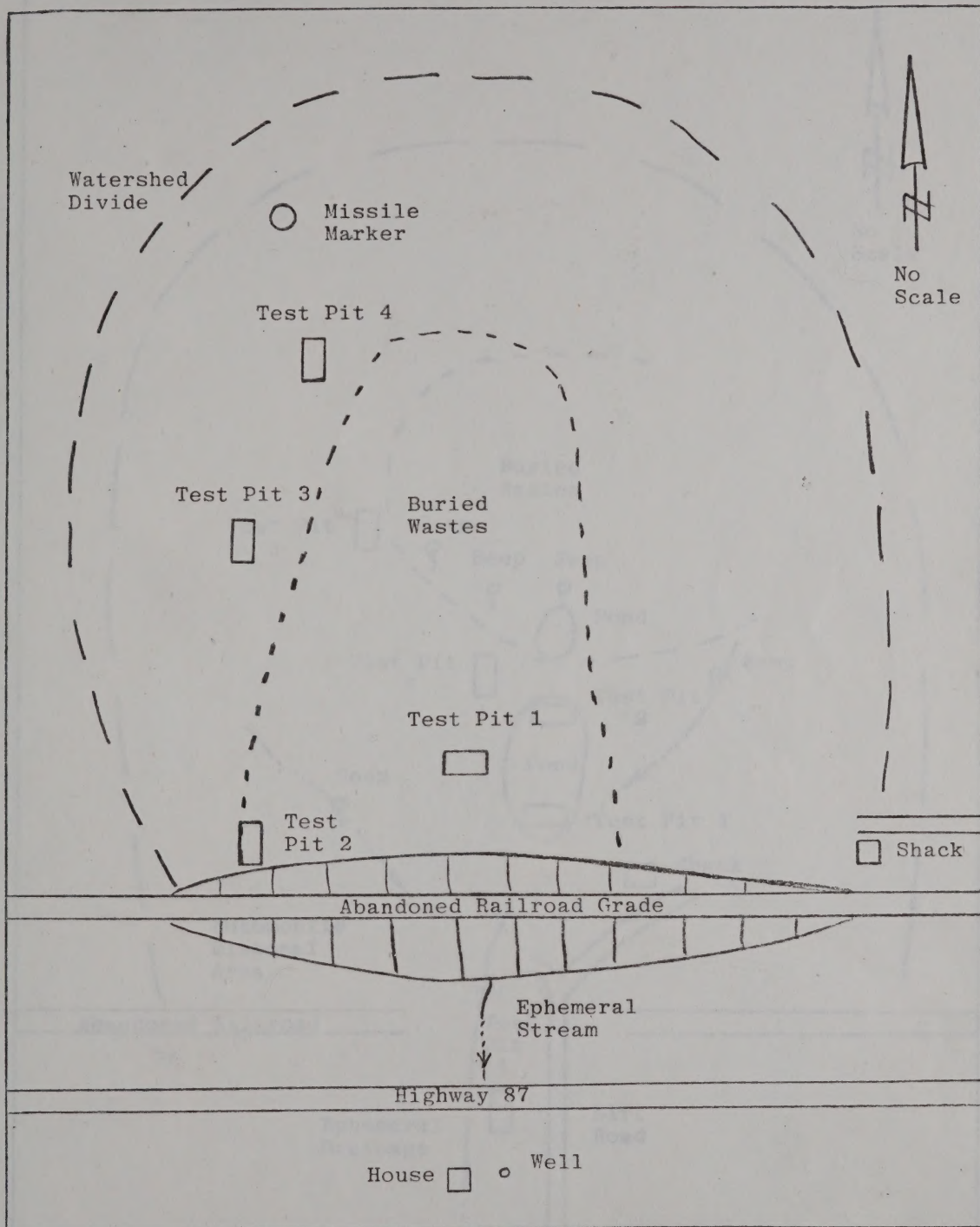


FIGURE 1. SKETCH MAP SHOWING LOCATIONS OF TEST PITS AT THE CADOTTE DISPOSAL SITE

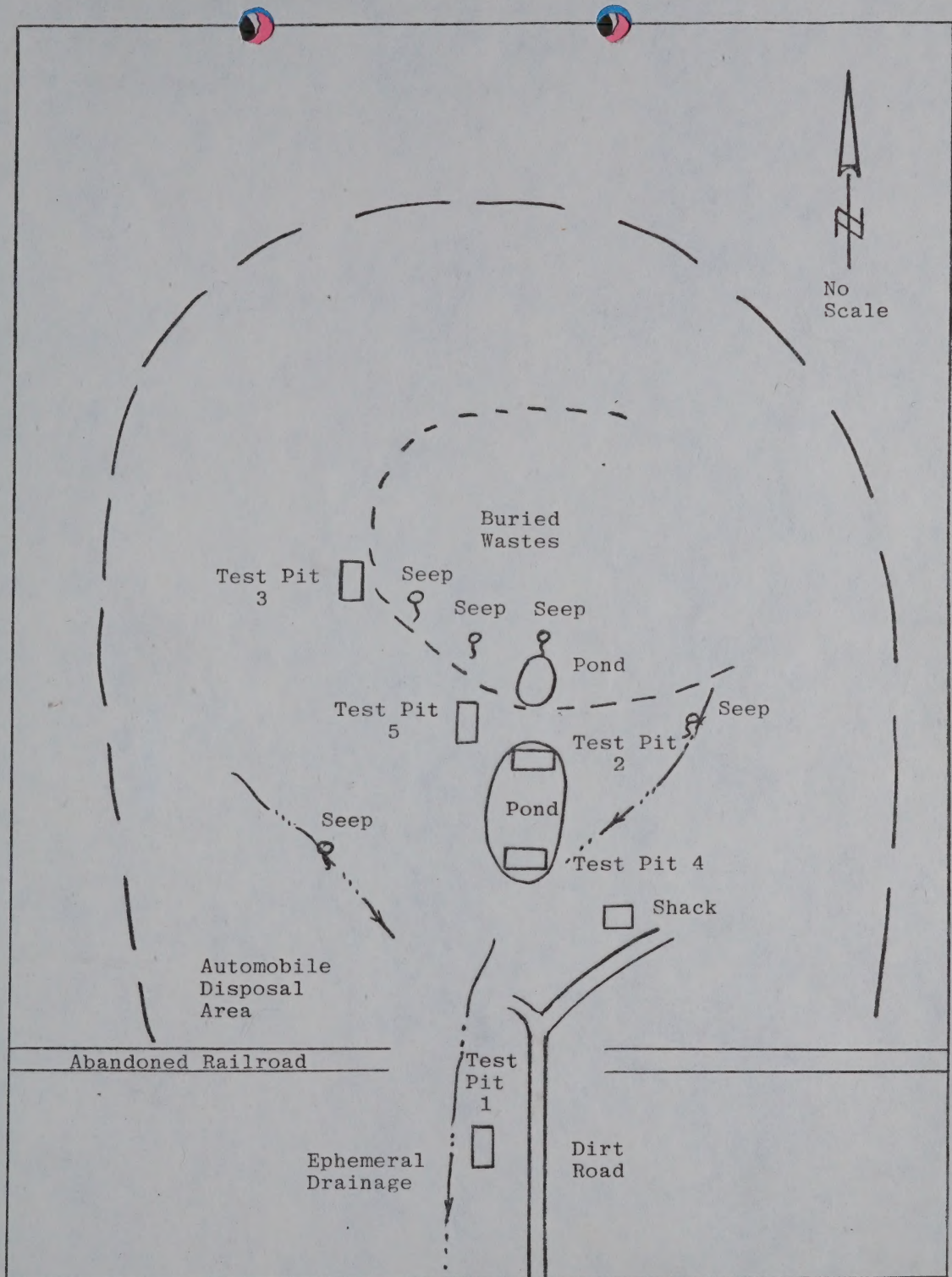


FIGURE 2. SKETCH MAP SHOWING LOCATIONS OF TEST PITS AT THE MR. M. DISPOSAL SITE

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DAMSCHEN & ASSOCIATES

SPRING 1997 GROUND-WATER MONITORING

JULY 1997

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DAMSCHEN & ASSOCIATES

**AUTUMN 1997 GROUND-WATER
MONITORING**

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SPRING 1996 GROUND-WATER ANALYSES

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DAMSCHE & ASSOCIATES, INC.
CONSULTING ENGINEERS

File: Fergus Co.
Sanitation Inc.
grd wtr (ANALY)

2030 11TH AVENUE • SUITE 11
P.O. BOX 4817 • HELENA, MT 59604

TELEPHONE (406) 449-8627
FAX (406) 449-8631

January 2, 1996

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JAN 08 1996

Montana Department of
Environmental Quality
Waste Management Division

Ms. Pat Potts
MDEQ Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Ms. Potts:

Enclosed please find the well logs, well completion forms and an updated facility map for the Sanitation, Inc. landfill in Lewistown, Montana. Also included herein are the laboratory reports of the ground-water sample analyses. For the sake of convenience, I have included the logs of all of the pertinent test borings and wells drilled to date at the facility. These logs were also presented in previous ground water and methane monitoring reports to the Department. The following is a summary of the work performed and a discussion of the data collected to date.

Well Installation

To this point in time, five test borings have been drilled at or near the Sanitation, Inc. landfill, as have four half-inch diameter methane monitoring wells and two piezometers. These are all located on Plate 1, attached.

In addition to those just noted, three ground-water monitoring wells were installed on August 15, 1995, and have been labeled SIMW-1, -2 and -3, respectively, on Plate 1. The well logs and construction forms are also attached to this correspondence. Small amounts of water were encountered at depths of 40 to 50 feet. The wells were all drilled and constructed in accordance with all applicable State regulations, and are outfitted with concrete protective pads and locking protective covers. All three wells were constructed with two-inch diameter pre-decontaminated PVC pipe and have 2.5-foot screens with factory-cut 0.010-inch slots. The construction details of the wells are also attached to this letter.

Hydrogeology

Stratigraphy. As noted in previous reports, this landfill is located geologically very close to the contact of the Colorado shale with the underlying Kootenai formation. The top of the Kootenai is generally identified as the uppermost red clay shale encountered beneath the Colorado. The Colorado in this area comprises approximately equal thicknesses of sandstone,

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silt- and mudstone, and sandy black clay shale. Using the published geological descriptions, the landfill site is underlain by Colorado group sediments, with the top of the Kootenai formation lying less than 100 feet below the ground surface. Previous investigations and the most recent drilling both confirm this.

The stratigraphy and surface geology were closely examined during this last field investigation. While variations in lithology were observed between drill holes on a small scale, the stratigraphy can be delineated broadly as a zone of limestone-cemented sandstone and siltstone, which is exposed at the surface, underlain sequentially by a zone of interbedded silt and clay, a zone of predominately sand and silt, a sand stratum that acts as the uppermost aquifer and, finally, a black clay shale aquitard. The sandstone and siltstone are exposed over the western and central portion of the landfill, while the lowermost black shale is exposed on the eastern portion of the facility. The exposed contact of the black shale with the overlying sand and silt beds is delineated on Plate 1. Cross sections showing the generalized interpretation of the stratigraphy are attached.

Ground-water Flow. The ground water appears to be flowing generally to the north-northwest perched atop one or more clay-rich aquitards. You will observe from the well logs that the aquitard(s) upon which the aquifer is perched lies at elevations of about 4,090 to 4,095 feet MSL at SIMW-1 and SIP-2, respectively. The strata dip to the north-northwest, as shown in the cross sections. The dip is also clearly observable in the field at 3 to 5 degrees northwest along a generally east-northeast strike.

With this in mind, the hydrogeological system becomes fairly clear. The perched aquifer lies atop a clay aquitard, with the aquifer being locally recharged by moisture moving laterally along the exposed carbonaceous clay shale. The recharge area includes a small pasture that occupies the head of a draw north and northeast of the landfill, along with much of the eastern extreme of the landfill proper. During the drilling, surface water in the pasture was observed flowing westward into the draw that lies along the northern boundary of the landfill. The flow was estimated at one-tenth of a cubic foot per second in a small, ephemeral channel. It is assumed that most of this water is infiltrating the ground, and is recharging the aquifer, because the small stock pond located directly north of the landfill contained very little water despite the steady flow observed to the east.

It is likely that the southern margin of the landfill also serves as a recharge area, although this southern boundary probably provides relatively little water to the system because the top of the aquitard lies along a very steep slope. This south-facing exposure probably has a very high evaporation rate and the high angle slope does not allow for a very effective water catchment.

Prior to the installation of these wells, it was assumed that the ground water had a more westerly component of flow. With this in mind, SIMW-1 was anticipated as being the background well for the system. The final measurements of the static water levels showed that SIMW-1 is probably not truly upgradient. Unfortunately, the location of the waste deposits relative to this localized ground-water system precludes installing a true background

well at this facility. A well cannot be placed up-gradient of the landfill because any such location would lie on the extreme limit of the aquifer at the recharge zone, and would not produce the requisite quantities of water for sampling. Good evidence for this conclusion is found in the test boring SI-5, which was drilled earlier this year (Plate 1). This test boring was advanced to a depth of 40 feet, with the terminus being at about 4,085 feet MSL. Based upon a projection of the base of the aquifer as measured at SIP-2, SIMW-1 and SIMW-2, the clay aquitard should have been encountered at an elevation of approximately 4,102 feet MSL. In fact, a clay shale bed was encountered at an elevation of about 4,105 feet MSL, and it is likely that this bed is an extension of the aquitard discovered farther to the north. No free moisture was detected at this horizon or below.

The ultimate fate of the ground water at this facility is still in question, but it probably follows the general dip of the top of the Kootenai formation until it discharges into a larger aquifer. It is possible that this water eventually merges with the alluvial aquifer in Breed Creek, to the north. The water table contours indicated on the enclosed map do not show a wide extent of the aquifer because it is difficult to project. For example, the gradient in the vicinity of SIMW-3 and SIP-1 would lead one to expect that the ground water might surface along the northern slope of the drainage that lay to the north of the landfill. In fact, no springs have been observed along this slope. In addition, a drainage pond was recently excavated at the toe of the active pit to a depth that might have intercepted the aquifer, yet no water or black clay shale was encountered. This is probably a result of discontinuities within the strata at a small scale. If you examine the well logs, you will see that clay or clay shale strata occur throughout the stratigraphic section and rarely can they be correlated over any distance. Thus, it would seem most likely that the perched water is moving downward in stair-step fashion, gradually migrating northward atop tabular, discontinuous clay-rich strata.

Another good example of this involves the apparently anomalous change in elevation of the clay strata at the base of the aquifer in SIP-1 and SIMW-3. Here, the dip of the top of the aquitard appears to steepen relative to the dip observed at the surface and correlated from the drilling data. In fact, the dip of the strata probably do not change, rather the clay stratum at the base of the aquifer at SIP-1 is laterally discontinuous to the north, and the water migrates downward to a deeper-lying clay bed before continuing northward to the vicinity of SIMW-3.

Aquifer Characteristics. Slug tests were performed on the wells immediately after development and the initial sampling. Some of the data seem a bit skewed, but this may be a result of performing such test immediately after drilling, well construction and development. Additional slug tests can be performed in the future with little effort, so another attempt may be made during the next sampling event. The results of the tests showed that SIMW-2 is screened in a more transmissive zone than either SIMW-1 or -3. An examination of the well log shows that SIMW-2 is screened in a stratum of sand that is relatively better sorted than the other two monitoring wells, which are both screened through interbedded sand, silt and clay. The results of the slug tests are shown in Table 1, and the associated graphs and calculations are attached.

The specific discharge can be determined by using the data presented in Table 1 along with

the simple assumption that the porosity of the aquifer is consistent and, because of its poorly-sorted nature, on the order of about 0.35. Therefore, the minimum specific discharge calculated in the eastern portion of the aquifer at monitoring well SIMW-1 would be the product of the hydraulic conductivity (14.6 feet/day), the gradient (0.05), the thickness of the aquifer (about 3.5 feet), the porosity (assumed at 0.35) and the width of the aquifer (assume a single, 100-foot width). This product is about 90 cubic feet per day per 100 feet of aquifer width. However, there is an order of magnitude discrepancy between the hydraulic conductivity measured at SIMW-1 and -2, with the latter having the higher conductivity. Substituting the hydraulic conductivity of 14.6 feet/day noted for SIMW-1 with 75 feet per day at SIMW-2 along with an aquifer thickness of 8 feet, one can calculate the specific discharge across 100 feet of aquifer to be on the order of 1,050 cubic feet per day.

The specific discharge at the western end of the landfill is somewhat different because of the steeper gradient. Using a hydraulic conductivity of 12.5 feet per day, a gradient of 0.045, a porosity of 0.35, an aquifer thickness of 9 feet and an arbitrary aquifer width of 100 feet, the specific discharge is 177 cubic feet per day. Again, this is calculated across 100 feet of the aquifer, because the continuity of the aquifer is not completely certain.

This uppermost aquifer recharges quickly enough to obtain samples for water quality analyses, but the wells can all be bailed dry by hand. It is clear that the aquifer has no resource potential due to its very small production. Nonetheless, it will prove to be an effective "first line of defense" in the process of monitoring the ground water.

Ground-Water Quality

After the installation and development of the monitoring wells, water samples were collected for full Table 1 analysis. In addition to these parameters, a suite comprising common cations and anions, ammonia nitrogen, TDS, and alkalinity was added to the analysis. The analytical reports, which are attached herein, show that the ground-water quality to be generally high, considering the nature of the aquifer. Dissolved ions and related measures are generally low and the pH is near neutral. No clear trends emerge from the inorganic and general water quality data, probably because these wells are situated more cross-gradient from each other than down-gradient. Thus, the pH rises and chemical oxygen demand appear to fall from east to west, while the sulfate and some other inorganic ions appear to be more concentrated at the middle well, SIMW-2. This may reflect the possible recharge occurring within the south-facing draw in the center of the facility, which lies just up-gradient from monitoring well SIMW-2.

The only inorganic constituents detected in anomalously high quantities are nitrate, selenium and nickel. The nitrate concentrations ranged from 3.78 in SIMW-2 to 8.96 milligrams per liter (mg/l) in SIMW-3. These concentrations all fall below the MCL for nitrate of 10 mg/l.

The selenium concentrations are all below the Human Health Standard listed in the July, 1994 WQB-7. The presence of selenium in ground water is commonly related to exposure to clay-rich sediments, organic fertilizers and animal waste. Thus, one would expect to find small

amounts of dissolved selenium in an aquifer such as this, which is perched on black clay shale. In addition, it is worthy to note that all of the ground around the facility with the exception of the southern boundary is open to grazing, including a large portion of the recharge area for the uppermost aquifer. This may also help to partially explain the presence of nitrate and, perhaps, selenium, in the ground water.

The presence of nickel can also be related to the exposure of ground water to clay-sized sediments. However, the sole nickel value is barely above the detection limit and is probably not significant, particularly since it is well below the Human Health Standard.

The volatile organics analysis report revealed the presence of small concentrations of refrigerants in wells SIMW-1 and -3. None of the values exceeded the PQLs, but this situation bears continued observation and diligence. It is worthy of note that a load of white goods was stored by the previous operator in an area that falls within the recharge zone of the uppermost aquifer. These white goods have since been removed, which may serve to eliminate the source of the refrigerants observed in the ground water. It is still possible, however, that refrigerant-bearing appliances have been buried in other areas of the landfill in the past. These older areas are currently in the process of being covered, so the potential for moisture infiltration will be reduced. We are hopeful that the refrigerant concentrations will be mitigated once the closure plans have been reviewed by the Department and implemented by Sanitation, Inc. However, only time and continued monitoring will affirm the effectiveness of capping the closed areas and removing other potential sources of ground-water contamination.

While probably of little impact to the ground water at the landfill, we need to point out that there is a missile silo located at the head of the draw that drains to the north of the landfill. The activities at this facility need to be taken into consideration, as do the agricultural activities of all the ground surrounding the landfill.

Summary

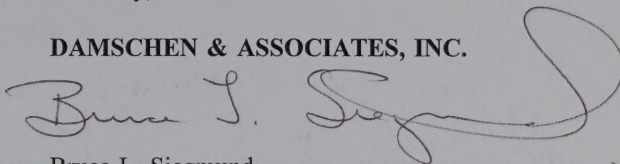
A perched aquifer underlies at least a portion of the Sanitation, Inc. landfill in Lewistown. This aquifer is recharged locally on the southern and eastern flanks of the landfill, and flows in a north-northwesterly direction. It is a very low-production aquifer with no resource value. The ground water contains relatively small concentrations of common dissolved ions, dominated by bicarbonate. Very small quantities of refrigerant-related hydrocarbons were detected in less-than-quantifiable concentrations, which suggests that the presence of the landfill is having a small impact on the uppermost aquifer. Anomalously high concentrations of nitrate were also observed in the ground water, but the input of this compound is doubtless influenced by the heavy agricultural applications of the property proximal to every border of the landfill.

We are continuing to work with Sanitation, Inc. in planning for the semi-annual ground-water monitoring events at the landfill. If you have any questions or require any additional information, please do not hesitate to contact us. We would also be happy to meet with you

at any time to discuss the hydrogeological aspects of the facility, if you wish.

Sincerely,

DAMSCHE & ASSOCIATES, INC.

A handwritten signature in dark ink, appearing to read "Bruce L. Siegmund". The signature is fluid and cursive, with a large, sweeping loop at the end.

Bruce L. Siegmund
Project Hydrogeologist

Attachments

CC: William Spoya, Sanitation, Inc.
Allen Gallagher, Sanitation, Inc.

Table 1. Hydraulic conductivity of the perched aquifer underlying the northern portion of the Sanitation, Inc. landfill, Lewistown, Montana.

Well	K	K
	(cm/sec)	(ft/day)
SIMW-1	4.39×10^{-3}	12.5
SIMW-2	2.64×10^{-2}	75.0
SIMW-3	5.14×10^{-3}	14.6



Figure 1. Cross section A-A', Sanitation, Inc., Lewistown, MT.

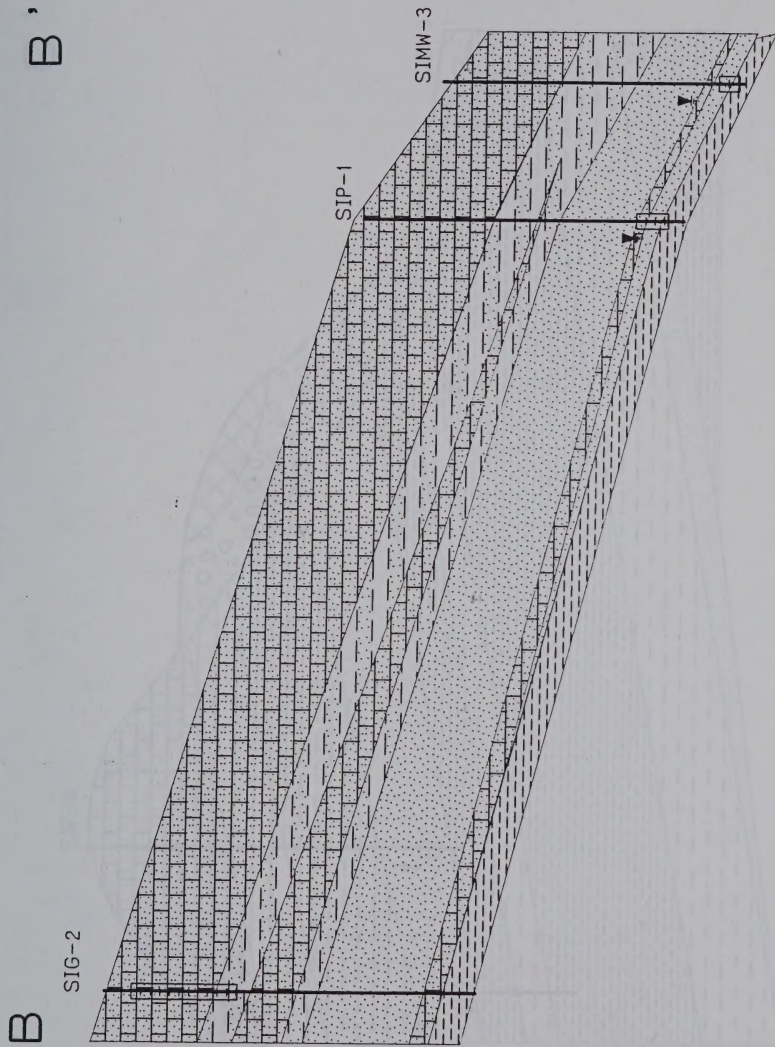


Figure 2. Cross section B-B', Sanitation, Inc., Lewistown, MT.

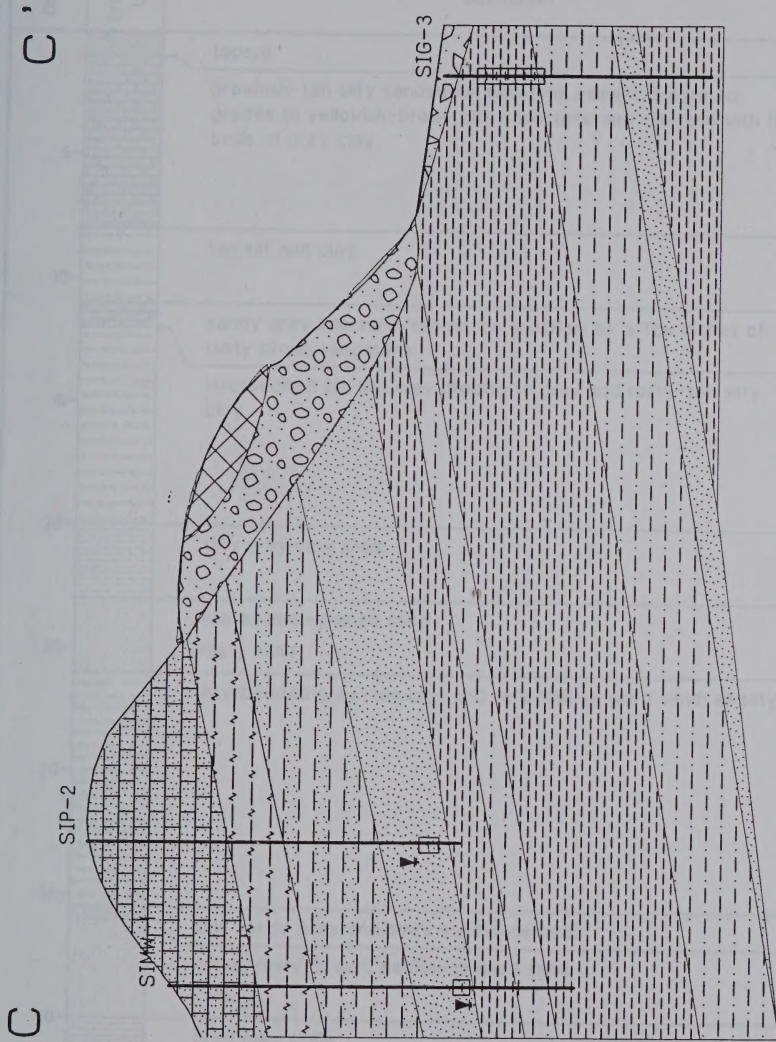


Figure 3. Cross section C-C', Sanitation, Inc., Lewistown, MT.

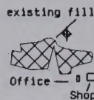
Sanitation, Inc. landfill
Lewistown, Montana

Boring Name: SIMW-1

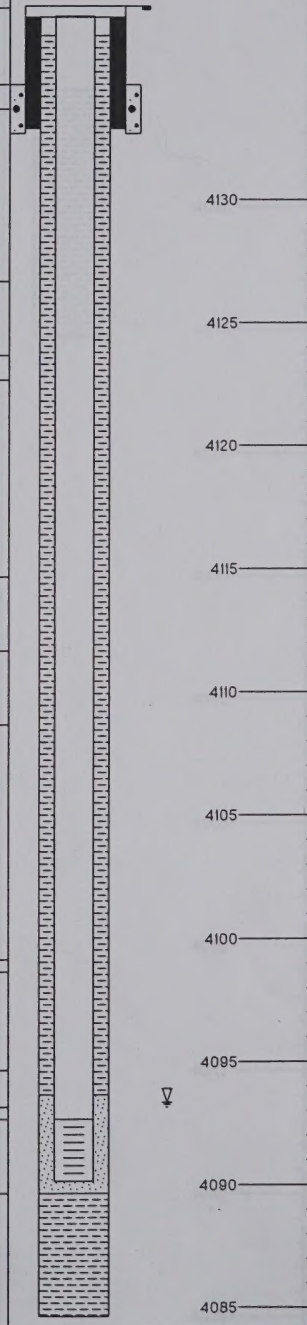
Job Number: 95-53B
Client: Sanitation, Inc., Lewistown, MT
Date: 8/15/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling, Sidney, MT
Total Depth: 60 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction Details



Depth	Graphic Log	Description
		topsoil
5		brownish-tan silty sandstone; limestone cement; fractured; grades to yellowish-brown silty sandstone and siltstone with thin beds of grey clay
10		tan silt and clay
15		sandy grey limestone/sandstone underlain by a few inches of rusty brown sandstone
20		interbedded silt and clay grading to grey and rusty-tan silty clay
25		silty grey clay shale
30		tan medium-grained sand rusty sand
35		interbedded grey-tan clay and very fine-grained sand; all silty
40		thin sandy limestone/limey sandstone beds clean, rusty-brown, medium-grained sand
45		grey clay shale
50		sandy grey limestone rusty brown sand punctuated by thin grey clay beds
		grey clay shale with minor interbedded tan to rusty brown sand and light grey silt



Sanitation, Inc. Landfill
Lewistown, Montana

Boat Name: SIMW-1

Job Number: 95-53B
Client: Sanitation, Inc., Lewistown, MT
Date: 8/15/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling, Sidney, MT
Total Depth: 60 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details

existing fill



Scale
1" = 10'

Depth	Graphic Log	Description
55		medium to dark gray silt with clay and minor sand
60		medium-grey silty clay with scattered silt and fine sand
65		
70		
75		
80		
85		
90		
95		
100		



4080

4075

4070

4065

4060

4055

4050

4045

4040

4035

Sanitation, Inc. (and fill)
Lewistown, Montana

Bo. Name: SIP-2

Job Number: 95-53D
Client: Sanitation, Inc., Lewistown, MT
Date: 1/23/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling
Total Depth: 54 ft.
TOC Elevation:
Geologist: Siegmund

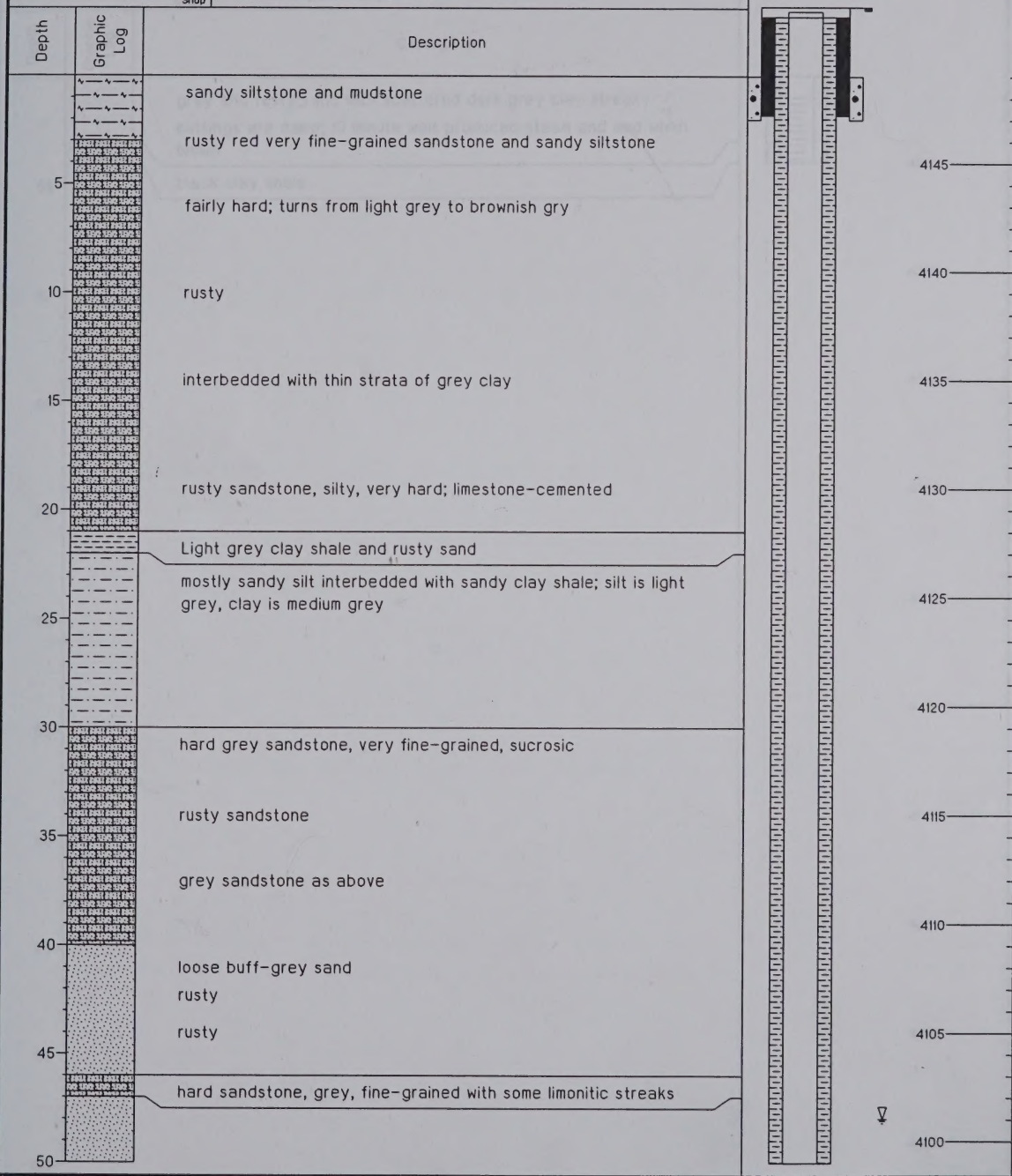
Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details

existing fill



1" = 20'



Sanitation, Inc. landfill
Lewistown, Montana

Boring Name: SIP-2

Job Number: 95-53D
Client: Sanitation, Inc., Lewistown, MT
Date: 1/23/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling
Total Depth: 54 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction Details

0 20 ft

existing fill



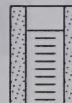
Depth

Graphic
Log

Description

grey and rusty sand with scattered dark grey clay streaks
cuttings are damp; 10 minute wait produced steam and mud when
blown

black clay shale



4095

4090

4085

4080

4075

4070

4065

4060

4055

4050

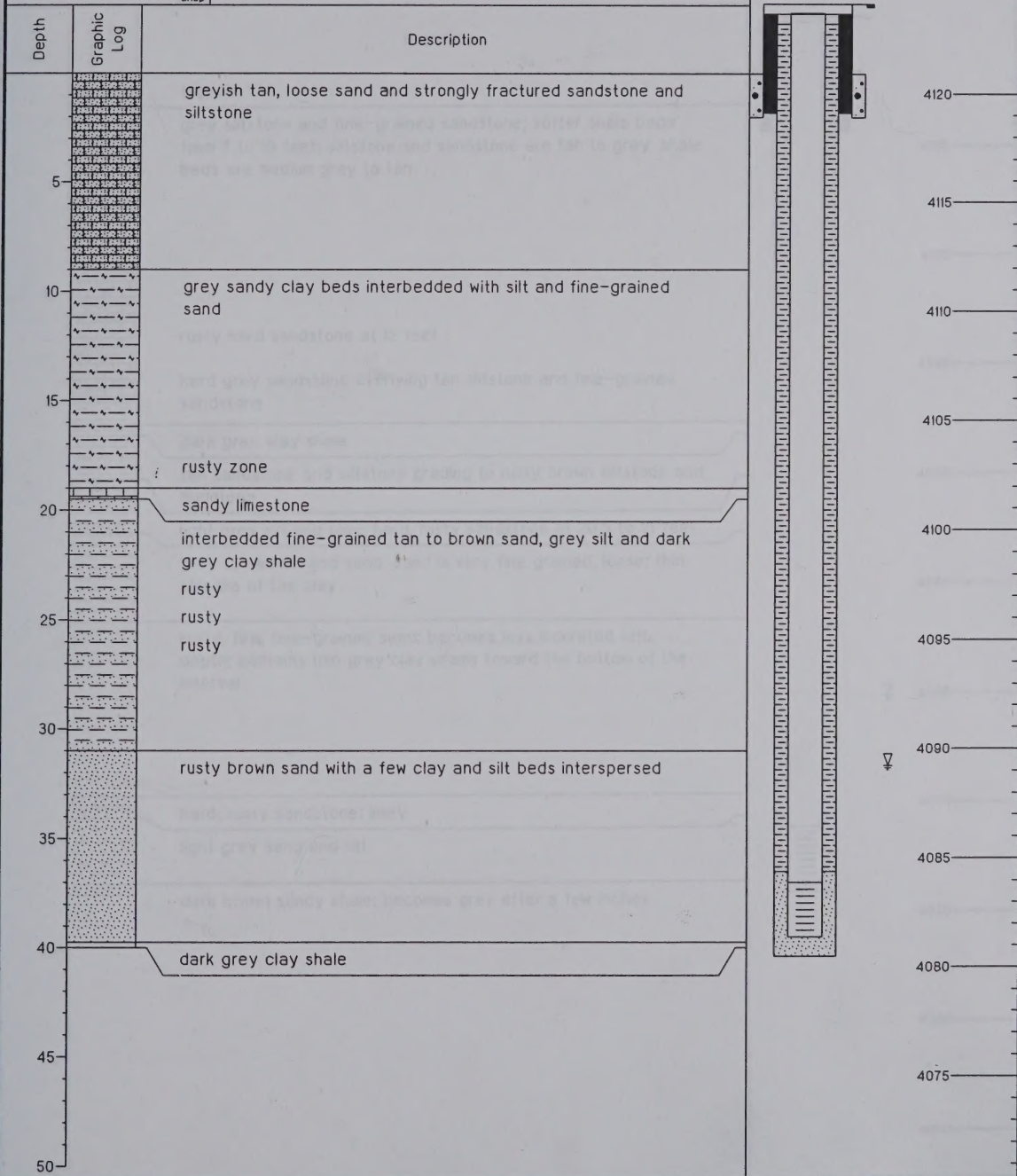
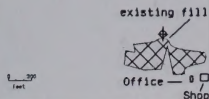
Sanitation, Inc. (landfill)
Lewistown, Montana

Box Name: SIMW-2

Job Number: 95-53D
Client: Sanitation, Inc., Lewistown, MT
Date: 8/15/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling
Total Depth: 40 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details



Sanitation, Inc. Jandfill
Lewistown, Montana

Boring Name: SIMW-3

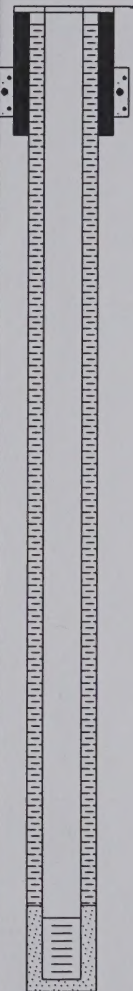
Job Number: 95-53D
Client: Sanitation, Inc., Lewistown, MT
Date: 8/15/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling, Sidney, MT
Total Depth: 37.5 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details



Depth	Graphic Log	Description
		topsoil
5		grey siltstone and fine-grained sandstone; softer shale beds from 7 to 10 feet; siltstone and sandstone are tan to grey; shale beds are medium grey to tan
10		rusty hard sandstone at 12 feet
15		hard grey sandstone overlying tan siltstone and fine-grained sandstone
		dark grey clay shale
20		tan sandstone and siltstone grading to rusty brown siltstone and mudstone
		light grey silt and clay; hard, rusty sandstone at 20.5 to 21 feet
25		grey to tan silt and sand; sand is very fine grained, loose; thin streaks of tan clay
30		rusty, firm, fine-grained sand; becomes less indurated with depth; contains thin grey clay seams toward the bottom of the interval
35		hard, rusty sandstone; limey
		light grey sand and silt
40		dark brown sandy shale; becomes grey after a few inches



4105

4100

4095

4090

4085

▽ 4080

4075

4070

4065

4060

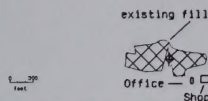
Sanitation, Inc. landfill
Lewistown, Montana

Boring Name: SI-5

Job Number: 93-51
Client: Sanitation, Inc., Lewistown, MT
Date: 1/24/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling, Sidney, MT
Total Depth: 40 ft.
TOC Elevation:
Geologist: B. Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction Details



Depth	Graphic Log	Description	
		fill; sand and gravel	4130
		rusty tan sandstone and siltstone	
5			4125
		tan clay	
10		buff to rusty brown sand with a few thin silt and clay beds; more clay and silt beds with depth	4120
15		dark grey carbonaceous clay shale	
		grey silt	4115
20		rust red silty sand, interbedded with thin carbonaceous shale beds at 18-20 feet	
		rusty siltstone	4110
		dark grey carbonaceous clay shale	
25			4105
		white to light grey silt	
30		rusty sandstone	4100
		white to light grey silt, rusty at 33'	
35		grey-green sandy silt from 33 to 36'	4095
		rusty buff silt and very fine-grained sand	
40			4090
45			4085
50			

Sanitation, Inc. Landfill
Lewistown, Montana

Boring Name: SIP-1

Job Number: 93-51
Client: Sanitation, Inc., Lewistown, MT
Date: 1/23/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling
Total Depth: 40 ft.
TOC Elevation:
Geologist: Siegmund

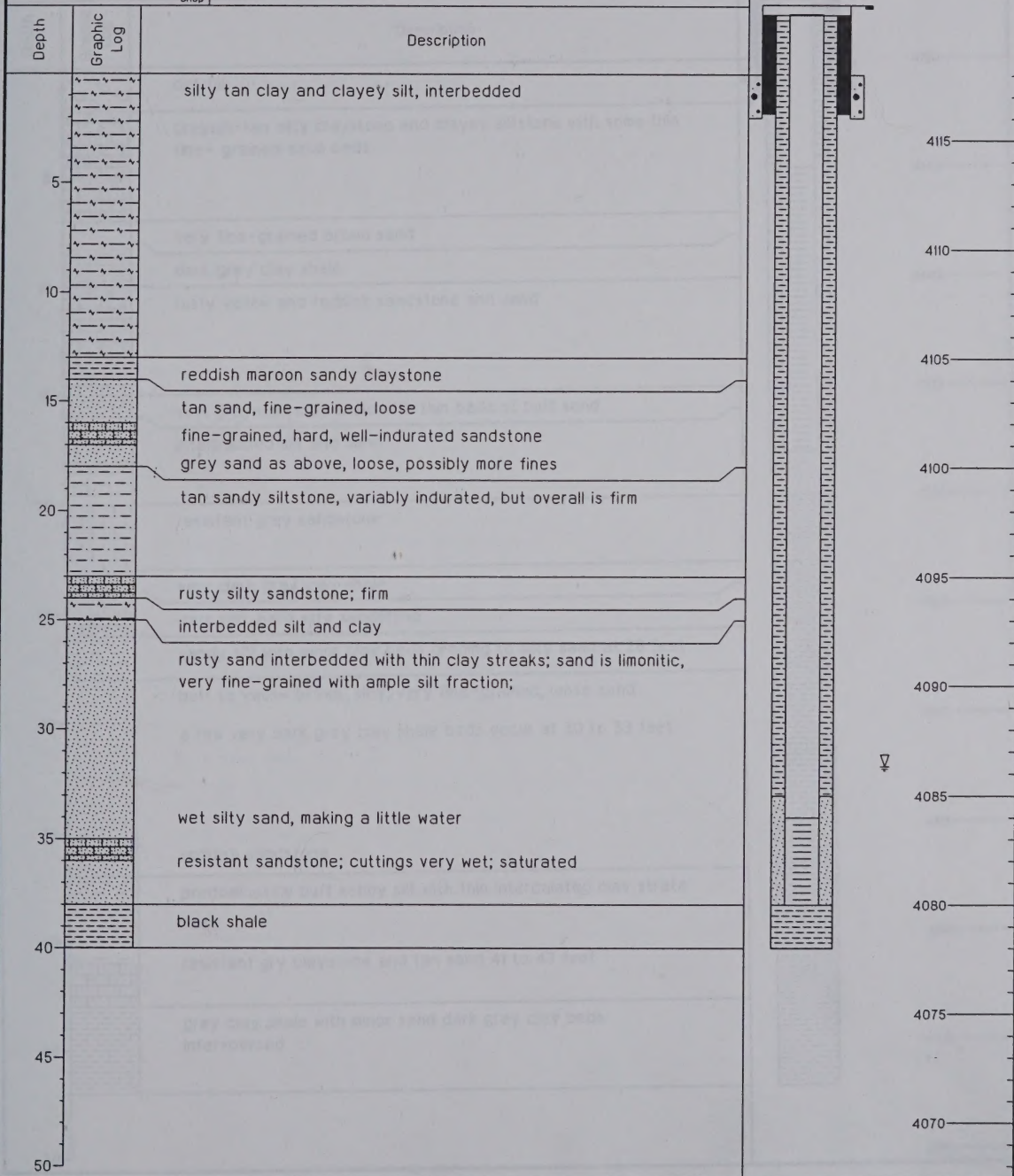
Damschen & Associates, Inc.
Helena, Montana

Well Construction Details

existing fill



1" = 20'



Sanitation, Inc. landfill
Lewistown, Montana

Bo. Name: SIG-2

Job Number:
Client: Sanitation, Inc., Lewistown, MT
Date: 1/24/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling
Total Depth: 47 ft.
TOC Elevation:
Geologist: Siegmund

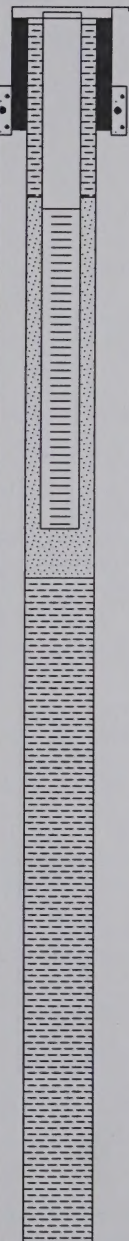
Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details

existing fill



Depth	Graphic Log	Description
		dirt fill
5		greyish-tan silty claystone and clayey siltstone with some thin fine-grained sand beds
		very fine-grained brown sand
10		dark grey clay shale
		rusty yellow and reddish sandstone and sand
15		soft grey-tan clay shale with thin beds of buff sand
		interbedded silt and sand
20		resistant grey sandstone
		very dark grey clay shale
25		dark red, hard silty sandstone
		sandy silt with minor clay beds grading to silty sand at 28 feet
30		buff to yellow brown, silty, very fine-grained, loose sand
		a few very dark grey clay shale beds occur at 30 to 33 feet
35		reddish sandstone
		predominately buff sandy silt with thin intercalated clay strata
40		resistant grey claystone and tan sand 41 to 43 feet
45		grey clay shale with minor sand dark grey clay beds interspersed
50		



4150

4145

4140

4135

4130

4125

4120

4115

4110

4105

4100

Sanitation, Inc. (andfill)
Lewistown, Montana

Bo. Name: SIG-3

Job Number:
Client: Sanitation, Inc., Lewistown, MT
Date: 1/24/95
Drilling Method: Air Rotary
Drilling Firm: Sharp Drilling, Sidney, MT
Total Depth: 40 ft.
TOC Elevation:
Geologist: Siegmund

Damschen & Associates, Inc.
Helena, Montana

Well Construction
Details

existing fill



1" = 20'

Depth

Graphic
Log

Description

fill; black clay shale and river gravel

black clay shale with rusty partings and fracture faces

light grey claystone

grey-brown sandy silt and siltstone; ample gypsum

scattered grey clay beds from 20 to 24 feet

dark grey clay shale

buff silt underlain by <0.5' silty limestone

sandstone and silty sand with scattered clay shale beds

grey clay shale

tan sand

grey clay shale, rusty at 35 feet

4095

4090

4085

4080

4075

4070

4065

4060

4055

4050

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm DAMSCHON + ASSOCIATES
---	-------------------------------

Facility/Project Name <u>SANITATION INC</u>	County Name <u>Fergus</u>	Well Name <u>SIMW-1</u>
Facility License Number <u>291</u>	County Code <u> </u>	MT Unique Well Number <u> </u>
		DHES Well Number <u> </u>

1. Can this well be purged dry? ☒ Yes ☐ No
2. Well development method
- | | |
|--------------------------------------|-------------------------------------|
| surged with bailer and bailed | ☒ |
| surged with bailer and pumped | ☐ |
| surged with block and bailed | ☐ |
| surged with block and pumped | ☐ |
| surged with block, bailed and pumped | ☐ |
| compressed air | ☐ |
| bailed only | ☐ |
| pumped only | ☐ |
| pumped slowly | ☐ |
| Other | ☐ |
3. Time spent developing well 45 min.
4. Depth of well (from top of casing) 47.5 ft.
5. Inside diameter of well 2 in.
6. Volume of water in filter pack and well casing 6 gal.
7. Volume of water removed from well ~5 gal.
8. Volume of water added (if any) 0 gal.
9. Source of water added
10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>4093.67</u> ft. <u>msl</u>	<u>4093.53</u> ft. <u>msl</u>
Date	b. <u>8/16/95</u> mm dd yy	<u>8/16/95</u> mm dd yy
Time	c. <u>9:</u> ☒ a.m. ☐ p.m.	<u>9:45</u> ☒ a.m. ☐ p.m.
12. Sediment in well bottom	<u> </u> inches	<u> </u> inches
13. Water clarity	Clear ☐ Turbid ☒ (Describe) <u>LT BRO</u>	Clear ☒ Turbid ☐ (Describe) <u>minor</u> <u>SILT HAZE</u>
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	<u> </u> mg/l	<u> </u> mg/l
15. COD	<u> </u> mg/l	<u> </u> mg/l

16. Additional comments on development

Well developed by: (Person's Name and Firm)

Name: BRUCE SIEGMUND

Firm: DAMSCHEN + ASSOC

I hereby certify that the above information is true and correct to the best of my knowledge

Signature: Bruce Siegmund

Print Initials: BLS

Firm: DAMSCHEN + ASSOC

Facility/Project Name SANITATION Inc.	Local Grid Location of Well _____ ft. ☐ N ☐ S _____ ft. ☐ E ☐ W	Well Name SIMW-2
Facility License 291	Grid Origin Location Lat. _____ Long. _____ or St. Plane _____ ft. N _____ ft. S	MT Unique Well Number _____ DHES Well Name _____
Type of Well Water Table Observation Well ☐ Piezometer ☐	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known	Date Well Installed 08/15/95 mm dd yy
Distance Well is From Waste/Source Boundary 75 ft.		Well Installed By: (Person's Name and Firm) JOHN SHARP SHARP DRILLING
Is Well a Point of Standards Application? ☒ Yes ☐ No		

A. Protective pipe, top elevation **4124** ft. MSL
B. Well casing, top elevation **4123.71** ft. MSL
C. Land Surface elevation **4117.41** ft. MSL
D. Surface seal, bottom _____ ft. MSL or **3** ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒
Hollow Stem Auger ☐
Other ☐

15. Drilling fluid used: Water ☐ Air ☒
Drilling Mud ☐ None ☐

16. Drilling additives used? ☒ Yes ☒ No

Describe _____

17. Source of water: _____

E. Bentonite seal, top _____ ft. MSL or **3** ft.
F. Fine sand, top _____ ft. MSL or **3** ft.
G. Filter pack, top _____ ft. MSL or **36** ft.
H. Screen joint, top _____ ft. MSL or **37** ft.
I. Well bottom _____ ft. MSL or **39.5** ft.
J. Filter pack, bottom _____ ft. MSL or **40.5** ft.
K. Borehole bottom _____ ft. MSL or **40.5** ft.
L. Borehole, diameter **6** in.
M. O.D. well casing _____ in.
N. I.D. well casing _____ in.

1. Cap and lock? ☐ Yes ☐ No

2. Protective cover pipe:

a. Inside diameter: **68** in.

b. Length: **5** ft.

c. Material: Steel ☒

Other ☐

d. Additional protection? ☐ Yes ☐ No

If yes, describe: _____

3. Surface seal: Bentonite ☐

Concrete ☒

Other ☐

4. Material between well casing and protective pipe:

Bentonite ☒

Annular space seal ☐

Other ☐

5. Annular space seal: a. Granular bentonite ☒

b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐

c. _____ Lbs/gal mud weight ... Bentonite slurry ☐

d. _____ % bentonite ... Bentonite cement grout ☐

e. _____ Ft³ volume added for any of the above

f. How installed: Tremie ☐

Tremie pumped ☐

Gravity ☒

6. Bentonite seal: a. Bentonite granules ☐

b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2. Bentonite pellets ☒

c. _____ Other ☐

7. Fine sand material: Manufacturer, product name & mesh size

a. **CSSF**

b. Volume added **1/2 BAC** ft³

8. Filter pack material: Manufacturer, product name & mesh size

a. **CSSF 20/40**

b. Volume added **1/2 BAC** ft³

9. Well casing: Flush threaded PVC schedule 40 ☒

Flush threaded PVC schedule 80 ☐

Other ☐

10. Screen material: **PVC SCH 40**

a. Screen type: Factory cut ☒

Continuous slot ☐

Other ☐

b. Manufacturer: **JOHNSON**

c. Slot size: **0.010** in.

d. Slotted length: **2.5** ft.

10. Screen material: None ☒

Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature **[Signature]** Firm **DANSCATON + ASSOC**

Facility/Project Name <u>SANITATION, INC.</u>	County Name <u>FERGUS</u>	Well Name <u>SIMW-2</u>	
Facility License Number <u>291</u>	County Code <u> </u>	MT Unique Well Number <u> </u>	DHES Well Number <u> </u>

1. Can this well be purged dry? ☒ Yes ☐ No
2. Well development method
- surged with bailer and bailed ☒
 - surged with bailer and pumped ☐
 - surged with block and bailed ☐
 - surged with block and pumped ☐
 - surged with block, bailed and pumped ☐
 - compressed air ☐
 - bailed only ☐
 - pumped only ☐
 - pumped slowly ☐
 - Other ☐
3. Time spent developing well 45 min.
4. Depth of well (from top of casing) 42.4 ft.
5. Inside diameter of well 2 in.
6. Volume of water in filter pack and well casing 21.3 gal.
7. Volume of water removed from well 5 gal.
8. Volume of water added (if any) 0 gal.
9. Source of water added
10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>4089.67</u> ft.	<u>4098.96</u> ft.
Date	b. <u>8/16/95</u> mm dd yy	<u>8/16/95</u> mm dd yy
Time	c. <u>10:15</u> ☒ a.m. ☐ p.m.	<u>11:00</u> ☒ a.m. ☐ p.m.
12. Sediment in well bottom	<u> </u> inches	<u> </u> inches
13. Water clarity	Clear ☐ Turbid ☒ (Describe) <u> </u>	Clear ☐ Turbid ☐ (Describe) <u> </u>
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	<u> </u> mg/l	<u> </u> mg/l
15. COD	<u> </u> mg/l	<u> </u> mg/l

16. Additional comments on development

Well developed by: (Person's Name and Firm)

Name: BRUCE SIEGMUND

Firm: DAMSCHEN + ASSOC.

I hereby certify that the above information is true and correct to the best of my knowledge

Signature: Bruce Siegmund

Print Initials: BLS

Firm: DAMSCHEN + ASSOC.

Facility/Project Name <u>Sanitation Inc.</u>	County Name <u>Fergus</u>	Well Name <u>SI MW - 3</u>
Facility License Number <u>291</u>	County Code _____	MT Unique Well Number _____
		DHES Well Number _____

1. Can this well be purged dry? ☒ Yes ☐ No
2. Well development method
- | | |
|--------------------------------------|-------------------------------------|
| surged with bailer and bailed | ☒ |
| surged with bailer and pumped | ☐ |
| surged with block and bailed | ☐ |
| surged with block and pumped | ☐ |
| surged with block, bailed and pumped | ☐ |
| compressed air | ☐ |
| bailed only | ☐ |
| pumped only | ☐ |
| pumped slowly | ☐ |
| Other _____ | ☐ |
3. Time spent developing well 45 min.
4. Depth of well (from top of casing) 39.2 ft
5. Inside diameter of well 2 in.
6. Volume of water in filter pack and well casing 1.3 gal.
7. Volume of water removed from well ~ 6 gal.
8. Volume of water added (if any) _____ gal.
9. Source of water added _____
10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. <u>4080.70</u> ft	<u>4079.38</u> ft
Date	b. <u>8/16/95</u> mm dd yy	<u>8/16/95</u> mm dd yy
Time	c. <u>11:15</u> ☒ a.m. ☒ p.m.	<u>72:00</u> ☒ a.m. ☒ p.m.
12. Sediment in well bottom	_____ inches	_____ inches
13. Water clarity	Clear ☐ Turbid ☒ (Describe) _____	Clear ☒ Turbid ☐ (Describe) _____
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development

Well developed by: (Person's Name and Firm)

Name: Bruce Siegmund

Firm: Damschen + Associates

I hereby certify that the above information is true and correct to the best of my knowledge

Signature: [Signature]

Print Initials: BS

Firm: Damschen + Assoc.

Sanitation, Inc.

SIMW-1

SWL 44.21 ft
well diam 2 in
well R 2.54 cm
hole diam 6 in
hole r 7.62 cm
h_o 1.59 ft
h_o 48.4632 cm
L 76.2 cm

Time	level	DTW	h/ho
0	1.590	44.21	1.000
30	1.480	42.73	0.931
60	1.400	41.33	0.881
90	1.320	40.01	0.830
120	1.210	38.8	0.761
150	1.080	37.72	0.679
180	0.980	36.74	0.616
210	0.900	35.84	0.566
240	0.780	35.06	0.491
270	0.710	34.35	0.447
300	0.610	33.74	0.384
330	0.490	33.25	0.308
360	0.420	32.83	0.264
390	0.350	32.48	0.220

To = 295 sec

K = 4.39E-03 cm/sec

K = 12.45 ft/day

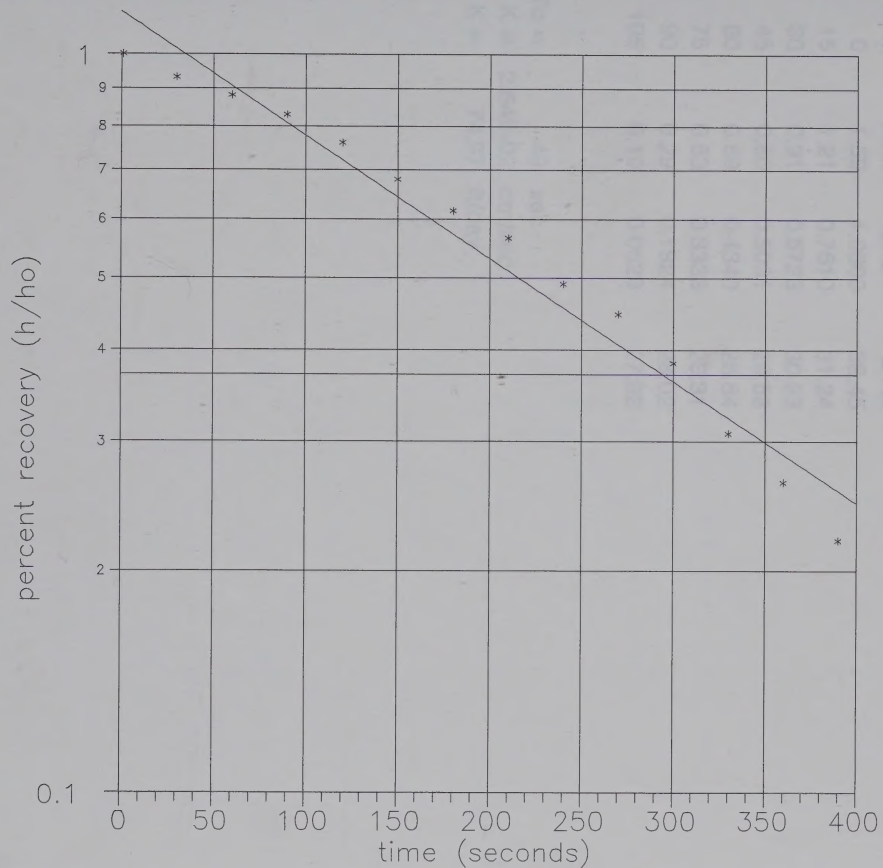


Figure 4. Graph of time versus h/h_0 from a slug test of ground-water monitoring well SIMW-1, Sanitation, Inc. landfill, Lewistown, Montana.

SIMW-2

SWL	34.04	ft
well diam	2	in
well R	2.54	cm
hole diam	6	in
hole r	7.62	cm
h_o	1.59	ft
h_o	48.4632	cm
Lo	76.2	cm

Time	level	h/ho	DTW
0	1.59	1.0000	32.45
15	1.21	0.7610	31.24
30	0.91	0.5723	30.33
45	0.80	0.5031	29.53
60	0.69	0.4340	28.84
75	0.53	0.3333	28.31
90	0.29	0.1824	28.02
105	0.10	0.0629	27.92

To =	49	sec
K =	2.64E-02	cm/sec
K =	74.97	ft/day

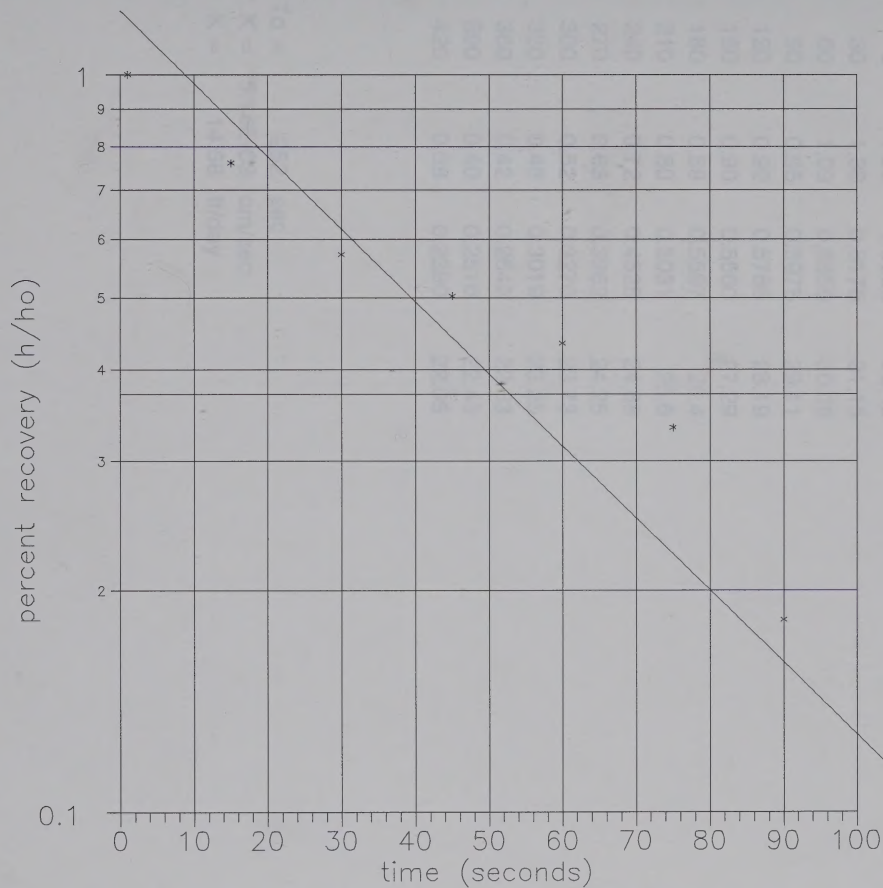


Figure 5. Graph of time versus h/h_0 from a slug test of ground-water monitoring well SIMW-2, Sanitation, Inc. landfill, Lewistown, Montana.

SIMW-3

SWL 30.21 ft
well diam 2 in
well R 2.54 cm
hole diam 6 in
hole r 7.62 cm
h_o 1.59 ft
h_o 48.4632 cm
Lo 76.2 cm

Time	level	h/ho	DTW
0	1.59	1.0000	32.45
30	1.30	0.8176	31.15
60	1.09	0.6855	30.06
90	0.95	0.5975	29.11
120	0.92	0.5786	28.19
150	0.90	0.5660	27.29
180	0.89	0.5597	26.4
210	0.80	0.5031	25.6
240	0.72	0.4528	24.88
270	0.63	0.3962	24.25
300	0.52	0.3270	23.73
330	0.48	0.3019	23.25
360	0.42	0.2642	22.83
390	0.40	0.2516	22.43
420	0.38	0.2390	22.05

To = 252 sec
K = 5.14E-03 cm/sec
K = 14.58 ft/day

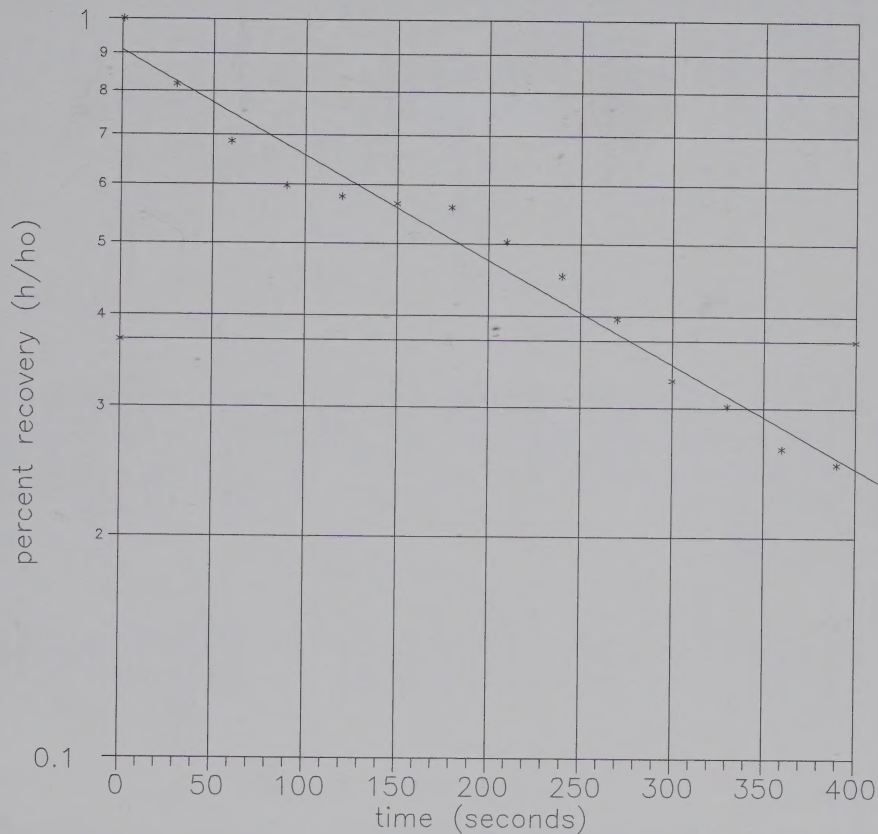


Figure 6. Graph of time versus h/h_0 from a slug test of ground-water monitoring well SIMW-3, Sanitation, Inc. landfill, Lewistown, Montana.

Well	collar	ground	TS	fro	01/23/95	08/16/95	08/16/95	09/27/95
SIP-1	4120.24	4117.49	39.85		4083.52	4086.07		
SIP-2	4151.34	4148.51	56.90		4098.02	4102.09		
SIMW-1	4137.88	4134.67	47.50			4093.67	4093.53	4093.36
SIMW-2	4123.71	4117.41	42.40			4089.67	4088.96	4089.21
SIMW-3	4110.91	4108.41	39.23			4080.70	4079.38	4079.86

(post development)

Report Date: 09/28/95

Detection Method: EPA 8210

Sample Matrix: WATER

File: /chem/52713.1/09281595.0/epa821001016.d

Warning: This laboratory flagrant Blank Quality Control Sample was extracted and analyzed with your set of samples to determine if method analytes or other interferences are present in the laboratory environment, the reagents, or the apparatus.

EPA METHOD 8210 VOLATILE ORGANICS ANALYSIS REPORT

CONCENTRATION UNITS = ug/L (ppb)

COMPOUND	CAT NO.	RESULT	QUALIFIER
Acetone	17-41-1	<1.0	0
Acrylonitrile	107-13-2	<1.0	0
Benzene	71-43-2	<1.0	0
Bromochloromethane	71-37-1	<1.0	0
Bromodichloromethane	71-37-4	<1.0	0
Bromofluoromethane	71-37-2	<1.0	0
Bromomethane	71-43-1	<1.0	0
Carbon disulfide	71-37-3	<1.0	0
Carbon tetrachloride	71-37-4	<1.0	0
Chloroacetylene	107-40-1	<1.0	0
Chloroethane	71-37-1	<1.0	0
Chloroform	67-68-2	<1.0	0
Chlorofluoromethane	71-37-2	<1.0	0
Dibromochloromethane	124-48-1	<1.0	0
1,1-Dibromo-2-chloroethane	96-11-0	<1.0	0
1,2-Dibromoethane	106-93-4	<1.0	0
Dibromomethane	71-37-1	<1.0	0
1,1-Dichloroethane	71-37-1	<1.0	0
1,2-Dichloroethane	107-40-1	<1.0	0
1,1-Dichloroethane	71-37-1	<1.0	0
trans-1,2-Dichloroethane	156-60-5	<1.0	0
1,2-Dichloropropane	71-37-2	<1.0	0
cis-1,3-Dichloropropane	10691-02-0	<1.0	0
cis-1,2-Dichloropropane	10691-02-0	<1.0	0
Diethyl ether	109-87-4	<1.0	0
1-Hexene	511-76-6	<1.0	0
Isobutane	71-37-1	<1.0	0
Methyl ethyl ketone	109-87-4	<1.0	0
Methyl isobutyl ketone	109-87-4	<1.0	0
Methylene chloride	71-37-1	<1.0	0
Styrene	106-93-4	<1.0	0
1,1,1,2-Tetrachloroethane	618-73-4	<1.0	0
1,1,2,2-Tetrachloroethane	71-37-2	<1.0	0
Tetrachloroethane	127-18-4	<1.0	0

Quality Control Sample: Laboratory Reagent Blank 25-AUG-95 22:01

Report Date: 08/26/95

Extraction Method: EPA 5030

Sample Matrix: WATER

File: /chem/5971A.1/va082595.b/aug251601016.d

Remarks: This Laboratory Reagent Blank Quality Control Sample was extracted and analyzed with your set of samples to determine if method analytes or other interferences are present in the laboratory environment, the reagents, or the apparatus.

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT

=====

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
Acetone	67-64-1	<50	U
Acrylonitrile	107-13-1	<20	U
Benzene	71-43-2	<1.0	U
Bromochloromethane	74-97-5	<1.0	U
Bromodichloromethane	75-27-4	<1.0	U
Bromoform	75-25-2	<1.0	U
Bromomethane	74-83-9	<1.0	U
Carbon disulfide	75-15-0	<1.0	U
Carbon tetrachloride	56-23-5	<1.0	U
Chlorobenzene	108-90-7	<1.0	U
Chloroethane	75-00-3	<1.0	U
Chloroform	67-66-3	<1.0	U
Chloromethane	74-87-3	<1.0	U
Dibromochloromethane	124-48-1	<1.0	U
1,2-Dibromo-3-chloropropane	96-12-8	<1.0	U
1,2-Dibromoethane	106-93-4	<1.0	U
Dibromomethane	74-95-3	<1.0	U
1,2-Dichlorobenzene	95-50-1	<1.0	U
1,4-Dichlorobenzene	106-46-7	<1.0	U
trans-1,4-Dichloro-2-butene	110-57-6	<2.0	U
Dichlorodifluoromethane	75-71-8	<1.0	U
1,1-Dichloroethane	75-34-3	<1.0	U
1,2-Dichloroethane	107-06-2	<1.0	U
1,1-Dichloroethene	75-35-4	<1.0	U
cis-1,2-Dichloroethene	156-59-2	<1.0	U
trans-1,2-Dichloroethene	156-60-5	<1.0	U
1,2-Dichloropropane	78-87-5	<1.0	U
cis-1,3-Dichloropropene	10061-01-5	<1.0	U
trans-1,3-Dichloropropene	10061-02-6	<1.0	U
Ethyl benzene	100-41-4	<1.0	U
2-Hexanone	591-78-6	<20	U
Iodomethane	74-88-4	<1.0	U
Methyl ethyl ketone	78-93-3	<20	U
Methyl isobutyl ketone	108-10-1	<20	U
Methylene chloride	75-09-2	<1.0	U
Styrene	100-42-5	<1.0	U
1,1,1,2-Tetrachloroethane	630-20-6	<1.0	U
1,1,2,2-Tetrachloroethane	79-34-5	<1.0	U
Tetrachloroethene	127-18-4	<1.0	U
Toluene	108-88-3	<1.0	U
1,1,1-Trichloroethane	71-55-6	<1.0	U

(report continued on page 2)

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT (continued)

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
1,1,2-Trichloroethane	79-00-5	<1.0	U
Trichloroethene	79-01-6	<1.0	U
Trichlorofluoromethane	75-69-4	<1.0	U
1,2,3-Trichloropropane	96-18-4	<1.0	U
Vinyl acetate	108-05-4	<1.0	U
Vinyl chloride	75-01-4	<1.0	U
m-p-Xylenes	108383/106423	<1.0	U
o-Xylene	95-47-6	<1.0	U

SURROGATE RECOVERY REPORT

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
1,2-Dichloroethane d4	10.0	9.86	99	80--120
Toluene d8	10.0	9.57	96	80--120
p-Bromofluorobenzene	10.0	9.69	97	80--120

QUALIFIER CODES EXPLANATION:

U= Indicates compound was analyzed for but not detected.

REPORT COMMENTS: None

Analyst: SP/wm Reviewing Supervisor: MTB

**ENERGY LABORATORIES, INC.**P.O. BOX 30916 • 1120 SOUTH 27TH STREET • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489

Client: Damschen and Associates, Inc.

Date Sampled: 16-AUG-95 09:00

Date Received: 18-AUG-95

Analysis Date: 25-AUG-1995 23:49

File: /chem/5971A.i/va082595.b/aug251901019.d

Project Info: Sanitation, Inc.

Sample Info: SITB-1

Lab No.: 95-50327

Report Date: 08/29/95

Extraction Method: EPA 5030

Sample Matrix: WATER

**EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT**

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
Acetone	67-64-1	<50	9.5J
Acrylonitrile	107-13-1	<20	U
Benzene	71-43-2	<1.0	U
Bromochloromethane	74-97-5	<1.0	U
Bromodichloromethane	75-27-4	<1.0	U
Bromoform	75-25-2	<1.0	U
Bromomethane	74-83-9	<1.0	U
Carbon disulfide	75-15-0	<1.0	U
Carbon tetrachloride	56-23-5	<1.0	U
Chlorobenzene	108-90-7	<1.0	U
Chloroethane	75-00-3	<1.0	U
Chloroform	67-66-3	<1.0	U
Chloromethane	74-87-3	<1.0	U
Dibromochloromethane	124-48-1	<1.0	U
1,2-Dibromo-3-chloropropane	96-12-8	<1.0	U
1,2-Dibromoethane	106-93-4	<1.0	U
Dibromomethane	74-95-3	<1.0	U
1,2-Dichlorobenzene	95-50-1	<1.0	U
1,4-Dichlorobenzene	106-46-7	<1.0	U
trans-1,4-Dichloro-2-butene	110-57-6	<2.0	U
Dichlorodifluoromethane	75-71-8	<1.0	U
1,1-Dichloroethane	75-34-3	<1.0	U
1,2-Dichloroethane	107-06-2	<1.0	U
1,1-Dichloroethene	75-35-4	<1.0	U
cis-1,2-Dichloroethene	156-59-2	<1.0	U
trans-1,2-Dichloroethene	156-60-5	<1.0	U
1,2-Dichloropropane	78-87-5	<1.0	U
cis-1,3-Dichloropropene	10061-01-5	<1.0	U
trans-1,3-Dichloropropene	10061-02-6	<1.0	U
Ethyl benzene	100-41-4	<1.0	U
2-Hexanone	591-78-6	<20	U
Iodomethane	74-88-4	<1.0	U
Methyl ethyl ketone	78-93-3	<20	3.0J
Methyl isobutyl ketone	108-10-1	<20	U
Methylene chloride	75-09-2	<1.0	U
Styrene	100-42-5	<1.0	U
1,1,1,2-Tetrachloroethane	630-20-6	<1.0	U
1,1,2,2-Tetrachloroethane	79-34-5	<1.0	U
Tetrachloroethene	127-18-4	<1.0	U
Toluene	108-88-3	<1.0	U
1,1,1-Trichloroethane	71-55-6	<1.0	U

(report continued on page 2)

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT (continued)

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
1,1,2-Trichloroethane	79-00-5	<1.0	U
Trichloroethene	79-01-6	<1.0	U
Trichlorofluoromethane	75-69-4	<1.0	U
1,2,3-Trichloropropane	96-18-4	<1.0	U
Vinyl acetate	108-05-4	<1.0	U
Vinyl chloride	75-01-4	<1.0	U
m+p-Xylenes	108383/106423	<1.0	U
o-Xylene	95-47-6	<1.0	U

SURROGATE RECOVERY REPORT

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
=====	=====	=====	=====	=====
1,2-Dichloroethane d4	10.0	10.0	100	80--120
Toluene d8	10.0	9.68	97	80--120
p-Bromofluorobenzene	10.0	9.73	97	80--120

QUALIFIER CODES EXPLANATION:

U= Indicates compound was analyzed for but not detected.

J= Estimated value. Present, but less than the limit of quantitation.

REPORT COMMENTS: None

Analyst: SD Reviewing Supervisor: WTF



ENERGY LABORATORIES, INC.

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LABORATORY REPORT

RECEIVED

TO: Bruce Siegmund
ADDRESS: Damschen & Associates
P.O. Box 4817
Helena, MT 59604

LAB NO.: 95-50324
DATE: 09/06/95
DAMSCHE & ASSOCIATES

WATER ANALYSIS

Sanitation, Inc., SIMW-1
Sampled 08/16/95 @ 1145
Submitted 08/18/95

Constituent	mg/l (ppm)	Date Analyzed
Potassium	3	08/21/95
Sodium	21	08/21/95
Calcium	109	08/21/95
Magnesium	40	08/21/95
Sulfate	95	08/23/95
Chloride	26	08/23/95
Carbonate	0	08/22/95
Bicarbonate	427	08/22/95
Total Dissolved Solids @ 180° C	510	08/24/95
Total Alkalinity as CaCO ₃	350	08/22/95
Specific Conductance @ 25° C	958 μ mhos/cm	08/18/95
pH	7.0 s.u.	08/18/95
Nitrate plus Nitrite as N	4.49	08/21/95
Total Cyanide	<0.005	08/21/95
Chemical Oxygen Demand	24	08/22/95
<u>Dissolved Metals</u>		
Antimony	<0.05	08/23/95
Arsenic	<0.005	08/22/95
Barium	<0.1	08/22/95
Beryllium	<0.001	08/22/95
Cadmium	<0.001	08/22/95
Chromium	<0.01	08/22/95
Cobalt	<0.01	08/22/95
Copper	<0.01	08/22/95
Iron	<0.03	08/22/95
Lead	<0.01	08/28/95
Mercury	<0.001	08/25/95
Nickel	<0.01	08/22/95
Selenium	0.017	08/22/95
Silver	<0.005	08/22/95
Thallium	<0.1	08/28/95
Vanadium	<0.10	08/22/95
Zinc	<0.01	08/22/95

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Client: Damschen and Associates, Inc.

Date Sampled: 16-AUG-95 11:45

Date Received: 18-AUG-95

Analysis Date: 26-AUG-1995 05:48

File: /chem/5971A.i/va082595.b/aug252901029.d

Project Info: Sanitation, Inc.

Sample Info: SIMW-1

Lab No.: 95-50324

Report Date: 08/29/95

Extraction Method: EPA 5030

Sample Matrix: WATER

**EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT**

=====

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
Acetone	67-64-1	<50	U
Acrylonitrile	107-13-1	<20	U
Benzene	71-43-2	<1.0	U
Bromochloromethane	74-97-5	<1.0	U
Bromodichloromethane	75-27-4	<1.0	U
Bromoform	75-25-2	<1.0	U
Bromomethane	74-83-9	<1.0	U
Carbon disulfide	75-15-0	<1.0	U
Carbon tetrachloride	56-23-5	<1.0	U
Chlorobenzene	108-90-7	<1.0	U
Chloroethane	75-00-3	<1.0	U
Chloroform	67-66-3	<1.0	U
Chloromethane	74-87-3	<1.0	U
Dibromochloromethane	124-48-1	<1.0	U
1,2-Dibromo-3-chloropropane	96-12-8	<1.0	U
1,2-Dibromoethane	106-93-4	<1.0	U
Dibromomethane	74-95-3	<1.0	U
1,2-Dichlorobenzene	95-50-1	<1.0	U
1,4-Dichlorobenzene	106-46-7	<1.0	U
trans-1,4-Dichloro-2-butene	110-57-6	<2.0	U
Dichlorodifluoromethane	75-71-8	<1.0	0.65J
1,1-Dichloroethane	75-34-3	<1.0	U
1,2-Dichloroethane	107-06-2	<1.0	U
1,1-Dichloroethene	75-35-4	<1.0	U
cis-1,2-Dichloroethene	156-59-2	<1.0	U
trans-1,2-Dichloroethene	156-60-5	<1.0	U
1,2-Dichloropropane	78-87-5	<1.0	U
cis-1,3-Dichloropropene	10061-01-5	<1.0	U
trans-1,3-Dichloropropene	10061-02-6	<1.0	U
Ethyl benzene	100-41-4	<1.0	U
2-Hexanone	591-78-6	<20	U
Iodomethane	74-88-4	<1.0	U
Methyl ethyl ketone	78-93-3	<20	U
Methyl isobutyl ketone	108-10-1	<20	U
Methylene chloride	75-09-2	<1.0	U
Styrene	100-42-5	<1.0	U
1,1,1,2-Tetrachloroethane	630-20-6	<1.0	U
1,1,2,2-Tetrachloroethane	79-34-5	<1.0	U
Tetrachloroethene	127-18-4	<1.0	U
Toluene	108-88-3	<1.0	U
1,1,1-Trichloroethane	71-55-6	<1.0	0.67J

(report continued on page 2)

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT (continued)

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
1,1,2-Trichloroethane	79-00-5	<1.0	U
Trichloroethene	79-01-6	<1.0	U
Trichlorofluoromethane	75-69-4	<1.0	0.49J
1,2,3-Trichloropropane	96-18-4	<1.0	U
Vinyl acetate	108-05-4	<1.0	U
Vinyl chloride	75-01-4	<1.0	U
m+p-Xylenes	108383/106423	<1.0	U
o-Xylene	95-47-6	<1.0	U

SURROGATE RECOVERY REPORT

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
=====	=====	=====	=====	=====
1,2-Dichloroethane d4	10.0	9.99	100	80--120
Toluene d8	10.0	9.58	96	80--120
p-Bromofluorobenzene	10.0	9.87	99	80--120

QUALIFIER CODES EXPLANATION:

- U= Indicates compound was analyzed for but not detected.
J= Estimated value. Present, but less than the limit of quantitation.

REPORT COMMENTS: None

Analyst: SD Reviewing Supervisor: MRB

**ENERGY LABORATORIES, INC.**P.O. BOX 30916 • 1120 SOUTH 27TH STREET • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489**LABORATORY REPORT**

TO: Bruce Siegmund
ADDRESS: Damschen & Associates
P.O. Box 4817
Helena, MT 59604

LAB NO.: 95-50325
DATE: 09/06/95 lm

WATER ANALYSIS

Sanitation, Inc., SIMW-2
Sampled 08/16/95 @ 1200
Submitted 08/18/95

Constituent	mg/l (ppm)	Date Analyzed
Potassium	4	08/21/95
Sodium	86	08/21/95
Calcium	147	08/21/95
Magnesium	53	08/21/95
Sulfate	224	08/23/95
Chloride	55	08/23/95
Carbonate	0	08/22/95
Bicarbonate	563	08/22/95
Total Dissolved Solids @ 180° C	803	08/24/95
Total Alkalinity as CaCO ₃	461	08/22/95
Specific Conductance @ 25° C	1480 μ mhos/cm	08/18/95
pH	7.1 s.u.	08/18/95
Nitrate plus Nitrite as N	3.78	08/21/95
Total Cyanide	<0.005	08/21/95
Chemical Oxygen Demand	22	08/22/95

Dissolved Metals

Antimony	<0.05	08/23/95
Arsenic	<0.005	08/22/95
Barium	<0.1	08/22/95
Beryllium	<0.001	08/22/95
Cadmium	<0.001	08/22/95
Chromium	<0.01	08/22/95
Cobalt	<0.01	08/22/95
Copper	<0.01	08/22/95
Iron	<0.03	08/22/95
Lead	<0.01	08/28/95
Mercury	<0.001	08/25/95
Nickel	0.02	08/23/95
Selenium	0.006	08/22/95
Silver	<0.005	08/22/95
Thallium	<0.1	08/28/95
Vanadium	<0.10	08/22/95
Zinc	<0.01	08/22/95

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Client: Damschen and Associates, Inc.

Date Sampled: 16-AUG-95 12:00

Date Received: 18-AUG-95

Analysis Date: 25-AUG-1995 21:25

File: /chem/5971A.1/va082595.b/aug251501015.d

Project Info: Sanitation, Inc.

Sample Info: SIMW-2

Lab No.: 95-50325

Report Date: 08/29/95

Extraction Method: EPA 5030

Sample Matrix: WATER

**EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT**

CONCENTRATION UNITS = ug/L (ppb)

COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
Acetone	67-64-1	<50	U
Acrylonitrile	107-13-1	<20	U
Benzene	71-43-2	<1.0	U
Bromochloromethane	74-97-5	<1.0	U
Bromodichloromethane	75-27-4	<1.0	U
Bromoform	75-25-2	<1.0	U
Bromomethane	74-83-9	<1.0	U
Carbon disulfide	75-15-0	<1.0	U
Carbon tetrachloride	56-23-5	<1.0	U
Chlorobenzene	108-90-7	<1.0	U
Chloroethane	75-00-3	<1.0	U
Chloroform	67-66-3	<1.0	U
Chloromethane	74-87-3	<1.0	U
Dibromochloromethane	124-48-1	<1.0	U
1,2-Dibromo-3-chloropropane	96-12-8	<1.0	U
1,2-Dibromoethane	106-93-4	<1.0	U
Dibromomethane	74-95-3	<1.0	U
1,2-Dichlorobenzene	95-50-1	<1.0	U
1,4-Dichlorobenzene	106-46-7	<1.0	U
trans-1,4-Dichloro-2-butene	110-57-6	<2.0	U
Dichlorodifluoromethane	75-71-8	<1.0	U
1,1-Dichloroethane	75-34-3	<1.0	U
1,2-Dichloroethane	107-06-2	<1.0	U
1,1-Dichloroethene	75-35-4	<1.0	U
cis-1,2-Dichloroethene	156-59-2	<1.0	U
trans-1,2-Dichloroethene	156-60-5	<1.0	U
1,2-Dichloropropane	78-87-5	<1.0	U
cis-1,3-Dichloropropene	10061-01-5	<1.0	U
trans-1,3-Dichloropropene	10061-02-6	<1.0	U
Ethyl benzene	100-41-4	<1.0	U
2-Hexanone	591-78-6	<20	U
Iodomethane	74-88-4	<1.0	U
Methyl ethyl ketone	78-93-3	<20	U
Methyl isobutyl ketone	108-10-1	<20	U
Methylene chloride	75-09-2	<1.0	U
Styrene	100-42-5	<1.0	U
1,1,1,2-Tetrachloroethane	630-20-6	<1.0	U
1,1,2,2-Tetrachloroethane	79-34-5	<1.0	U
Tetrachloroethene	127-18-4	<1.0	U
Toluene	108-88-3	<1.0	U
1,1,1-Trichloroethane	71-55-6	<1.0	U

(report continued on page 2)

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT (continued)

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
1,1,2-Trichloroethane	79-00-5	<1.0	U
Trichloroethene	79-01-6	<1.0	U
Trichlorofluoromethane	75-69-4	<1.0	U
1,2,3-Trichloropropane	96-18-4	<1.0	U
Vinyl acetate	108-05-4	<1.0	U
Vinyl chloride	75-01-4	<1.0	U
m+p-Xylenes	108383/106423	<1.0	U
o-Xylene	95-47-6	<1.0	U

SURROGATE RECOVERY REPORT

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
=====	=====	=====	=====	=====
1,2-Dichloroethane d4	10.0	9.83	98	80--120
Toluene d8	10.0	9.68	97	80--120
p-Bromofluorobenzene	10.0	9.24	92	80--120

QUALIFIER CODES EXPLANATION:

U= Indicates compound was analyzed for but not detected.

REPORT COMMENTS: None

Analyst: SP Reviewing Supervisor: MJB

**ENERGY LABORATORIES, INC.**P.O. BOX 30916 • 1120 SOUTH 27TH STREET • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489**LABORATORY REPORT**

TO: Bruce Siegmund
ADDRESS: Damschen & Associates
P.O. Box 4817
Helena, MT 59604

LAB NO.: 95-50326
DATE: 09/06/95 lm

WATER ANALYSIS

Sanitation, Inc., SIMW-3
Sampled 08/16/95 @ 1245
Submitted 08/18/95

<u>Constituent</u>	<u>mg/l (ppm)</u>	<u>Date Analyzed</u>
Potassium	2	08/21/95
Sodium	37	08/21/95
Calcium	86	08/21/95
Magnesium	32	08/21/95
Sulfate	140	08/23/95
Chloride	34	08/23/95
Carbonate	0	08/22/95
Bicarbonate	264	08/22/95
Total Dissolved Solids @ 180° C	463	08/24/95
Total Alkalinity as CaCO ₃	217	08/22/95
Specific Conductance @ 25° C	893 μ mhos/cm	08/18/95
pH	7.3 s.u.	08/18/95
Nitrate plus Nitrite as N	8.96	08/21/95
Total Cyanide	<0.005	08/21/95
Chemical Oxygen Demand	12	08/22/95
<u>Dissolved Metals</u>		
Antimony	<0.05	08/23/95
Arsenic	<0.005	08/22/95
Barium	<0.1	08/22/95
Beryllium	<0.001	08/22/95
Cadmium	<0.001	08/22/95
Chromium	<0.01	08/22/95
Cobalt	<0.01	08/22/95
Copper	<0.01	08/22/95
Iron	<0.03	08/22/95
Lead	<0.01	08/22/95
Mercury	<0.001	08/25/95
Nickel	<0.01	08/22/95
Selenium	0.021	08/22/95
Silver	<0.005	08/22/95
Thallium	<0.1	08/28/95
Vanadium	<0.10	08/22/95
Zinc	<0.01	08/22/95

**ENERGY LABORATORIES, INC.**P.O. BOX 30916 • 1120 SOUTH 27TH STREET • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489

Client: Damschen and Associates, Inc.

Date Sampled: 16-AUG-95 12:45

Date Received: 18-AUG-95

Analysis Date: 25-AUG-1995 22:37

File: /chem/5971A.i/va082595.b/aug251701017.d

Project Info: Sanitation, Inc.

Sample Info: SIMW-3

Lab No.: 95-50326

Report Date: 08/29/95

Extraction Method: EPA 5030

Sample Matrix: WATER

**EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT**

=====

CONCENTRATION UNITS = ug/L (ppb)			
COMPOUNDS	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
Acetone	67-64-1	<50	12J
Acrylonitrile	107-13-1	<20	U
Benzene	71-43-2	<1.0	U
Bromochloromethane	74-97-5	<1.0	U
Bromodichloromethane	75-27-4	<1.0	U
Bromoform	75-25-2	<1.0	U
Bromomethane	74-83-9	<1.0	U
Carbon disulfide	75-15-0	<1.0	U
Carbon tetrachloride	56-23-5	<1.0	U
Chlorobenzene	108-90-7	<1.0	U
Chloroethane	75-00-3	<1.0	U
Chloroform	67-66-3	<1.0	U
Chloromethane	74-87-3	<1.0	U
Dibromochloromethane	124-48-1	<1.0	U
1,2-Dibromo-3-chloropropane	96-12-8	<1.0	U
1,2-Dibromoethane	106-93-4	<1.0	U
Dibromomethane	74-95-3	<1.0	U
1,2-Dichlorobenzene	95-50-1	<1.0	U
1,4-Dichlorobenzene	106-46-7	<1.0	U
trans-1,4-Dichloro-2-butene	110-57-6	<2.0	U
Dichlorodifluoromethane	75-71-8	<1.0	0.20J
1,1-Dichloroethane	75-34-3	<1.0	0.21J
1,2-Dichloroethane	107-06-2	<1.0	U
1,1-Dichloroethene	75-35-4	<1.0	U
cis-1,2-Dichloroethene	156-59-2	<1.0	U
trans-1,2-Dichloroethene	156-60-5	<1.0	U
1,2-Dichloropropane	78-87-5	<1.0	U
cis-1,3-Dichloropropene	10061-01-5	<1.0	U
trans-1,3-Dichloropropene	10061-02-6	<1.0	U
Ethyl benzene	100-41-4	<1.0	U
2-Hexanone	591-78-6	<20	U
Iodomethane	74-88-4	<1.0	U
Methyl ethyl ketone	78-93-3	<20	U
Methyl isobutyl ketone	108-10-1	<20	U
Methylene chloride	75-09-2	<1.0	U
Styrene	100-42-5	<1.0	U
1,1,1,2-Tetrachloroethane	630-20-6	<1.0	U
1,1,2,2-Tetrachloroethane	79-34-5	<1.0	U
Tetrachloroethene	127-18-4	<1.0	U
Toluene	108-88-3	<1.0	U
1,1,1-Trichloroethane	71-55-6	<1.0	0.54J

(report continued on page 2)

EPA METHOD 8260
VOLATILE ORGANICS ANALYSIS REPORT (continued)

=====

COMPOUNDS	CONCENTRATION UNITS = ug/L (ppb)		
	CAS NO.	RESULT	QUALIFIER
=====	=====	=====	=====
1,1,2-Trichloroethane	79-00-5	<1.0	U
Trichloroethene	79-01-6	<1.0	U
Trichlorofluoromethane	75-69-4	<1.0	0.17J
1,2,3-Trichloropropane	96-18-4	<1.0	U
Vinyl acetate	108-05-4	<1.0	U
Vinyl chloride	75-01-4	<1.0	U
m+p-Xylenes	108383/106423	<1.0	U
o-Xylene	95-47-6	<1.0	U

----- SURROGATE RECOVERY REPORT -----

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
=====	=====	=====	=====	=====
1,2-Dichloroethane d4	10.0	9.96	100	80--120
Toluene d8	10.0	9.58	96	80--120
p-Bromofluorobenzene	10.0	9.07	91	80--120

QUALIFIER CODES EXPLANATION:

- U= Indicates compound was analyzed for but not detected.
J= Estimated value. Present, but less than the limit of quantitation.

REPORT COMMENTS: None

Analyst: BD Reviewing Supervisor: MSB

EPA METHOD 8260 BLANK SPIKE REPORT

=====

Quality Control Sample: Certified Reference Sample Analysis 24-AUG-1995 16:39

Report Date: 08/25/95

Extraction Method: EPA 5030

Sample Matrix: WATER

File: /chem/5971A.1/va082495.b/aug240901009.d

Remarks: This certified reference sample was spiked into a blank sample matrix then extracted and analyzed with your set of samples to determine if the methodology is in control and to monitor the laboratory's ability to produce accurate results.

CONCENTRATION UNITS = ug/L (ppb)

Spike Compound	Added	Measured	%Rec	QC Limits
=====	=====	=====	=====	=====
Carbon tetrachloride	5.00	3.87	77	60--140
Chlorobenzene	5.00	3.99	80	60--140
1,3-Dichlorobenzene	5.00	4.28	86	60--140
1,4-Dichlorobenzene	5.00	4.24	85	60--140
1,2-Dichloroethane	5.00	3.84	77	60--140
1,1-Dichloroethene	5.00	3.86	77	60--140
trans-1,2-Dichloroethene	5.00	3.98	80	60--140
1,2-Dichloropropane	5.00	3.99	80	60--140
Ethyl benzene	5.00	4.26	85	60--140
Tetrachloroethene	5.00	4.11	82	60--140
1,1,2-Trichloroethane	5.00	3.38	68	60--140

SURROGATE RECOVERY REPORT

Surrogate Compound	Added ug/L	Measured ug/L	%Rec	QC Limits
=====	=====	=====	=====	=====
1,2-Dichloroethane d4	10.0	9.63	96	80--120
Toluene d8	10.0	9.70	97	80--120
p-Bromofluorobenzene	10.0	9.43	94	80--120

REPORT COMMENTS: None

Analyst: RD Reviewing Supervisor: MTB

Lab Nos. 95-50324-6

QUALITY ASSURANCE DATA PACKAGE

This report includes the results of quality assurance tests performed with the sample analyses. They are performed to determine if the methodology is in control and to monitor the laboratory's ability to produce accurate and precise results.

Constituent	Duplicate Analysis -----mg/l (ppm)-----		Spiked Analysis, %	Blank Analysis, mg/l (ppm)	Sample Analysis, mg/l (ppm)	-----Reference----- Acceptance Range, mg/l (ppm)	Date Analyzed
	Original	Duplicate	Recovery				
Potassium	3	3	93	<1	21	17-23	08/21/95
Sodium	43	44	95	<1	50	42-58	08/21/95
Calcium	32	32	97	<1	51	42-58	08/21/95
Magnesium	2	2	97	<1	50	42-58	08/21/95
Sulfate	1070	1070	99	<1	319	286-350	08/23/95
Chloride	9	8	97	<1	76	69-85	08/23/95
Total Dissolved Solids @ 180° C	67	78	105	<1	N/A	N/A	08/24/95
Total Alkalinity as CaCO ₃	350	350	101	3	108	85-115	08/22/95
Specific Conductance @ 25° C μmhos/cm	1120	1110	N/A	1	N/A	N/A	08/18/95
pH, s.u.	4.5	4.6	N/A	N/A	N/A	N/A	08/18/95
Nitrate plus Nitrite as N	0.14	0.14	101	<0.05	2.51	2.05-3.10	08/21/95
Total Cyanide	<0.005	<0.005	108	<0.005	0.262	0.138-0.341	08/21/95
Chemical Oxygen Demand	12	12	98	<1	38	23-43	08/22/95
<u>Dissolved Metals</u>							
Antimony	<0.05	<0.05	96	<0.05	0.02	0.01-0.03	08/23/95
Arsenic	<0.005	<0.005	87	<0.005	0.021	0.019-0.030	08/22/95
Barium	<0.1	<0.1	102	<0.1	1.0	0.9-1.2	08/22/95
Beryllium	<0.001	<0.001	108	<0.001	1.05	0.85-1.15	08/22/95
Cadmium	<0.001	<0.001	103	<0.001	1.04	0.85-1.15	08/22/95
Chromium	<0.01	<0.01	102	<0.01	1.03	0.85-1.15	08/22/95
Cobalt	<0.01	<0.01	97	<0.01	1.01	0.85-1.15	08/22/95
Copper	<0.01	<0.01	98	<0.01	1.02	0.85-1.15	08/22/95
Iron	<0.03	<0.03	102	<0.03	1.03	0.85-1.15	08/22/95
Lead	0.02	0.02	93	<0.01	1.03	0.85-1.15	08/22/95
Mercury	<0.001	<0.001	108	<0.001	0.001	0.001-0.002	08/18/95
Nickel	0.01	0.01	97	<0.01	1.02	0.85-1.15	08/22/95
Selenium	0.006	0.006	109	<0.005	0.108	0.081-0.128	08/22/95
Silver	<0.005	<0.005	97	<0.005	1.03	0.85-1.15	08/22/95
Thallium	<0.1	<0.1	100	<0.1	0.019	0.014-0.028	08/28/95
Vanadium	<0.10	<0.10	102	<0.10	1.03	0.85-1.15	08/22/95
Zinc	<0.01	<0.01	89	<0.01	1.03	0.85-1.15	08/22/95

PLEASE PRINT OR TYPE ALL
INFORMATION EXCEPT SIGNATURES

P.O. #	Project Name / Address
--------	------------------------

SANITATION, INC.

Contact Name & Phone

Sampler's signature

BRUCE SIEGMUND

Bruce

Invoice to:

Damschen + Assoc

PO Box 4817

HERENA MT 59604-4817

Report to:

As Above.

SAMPLE I.D.

number of containers

Sample Type: A W S V U O
Air Water Soils/solids Vegetation Urine Other

Analysis Requested
MT. SOLID WASTE TABLE 1 + DICHORO-
DIFLUORO METHANE
WATER SONS (DOMESTIC DRINKING -
8260 ONLY
MT. SOLID WASTE TABLE

Comments, Special Instructions, etc.

8/10/93	1145
---------	------

SIMW-1

6w	x	x
----	---	---

↑	1200
---	------

SIMW-2

6w	x	x
----	---	---

↓	1245
---	------

SIMW-3

low	x	x
-----	---	---

8/16/92	900
---------	-----

SITB - 1

2w			x
----	--	--	---

1. Relinquished (signature)

Date _____

Time

Received by: (signature)

3. Relinquished (signature)

Date _____

Time

Received by (signature):

2. Relinquished (signature)

Date _____

Time

Received by: (signature)

4. Relinquished (signature)

Date _____

Time

Received for laboratory by
A (signature):

08/18/95	14.35
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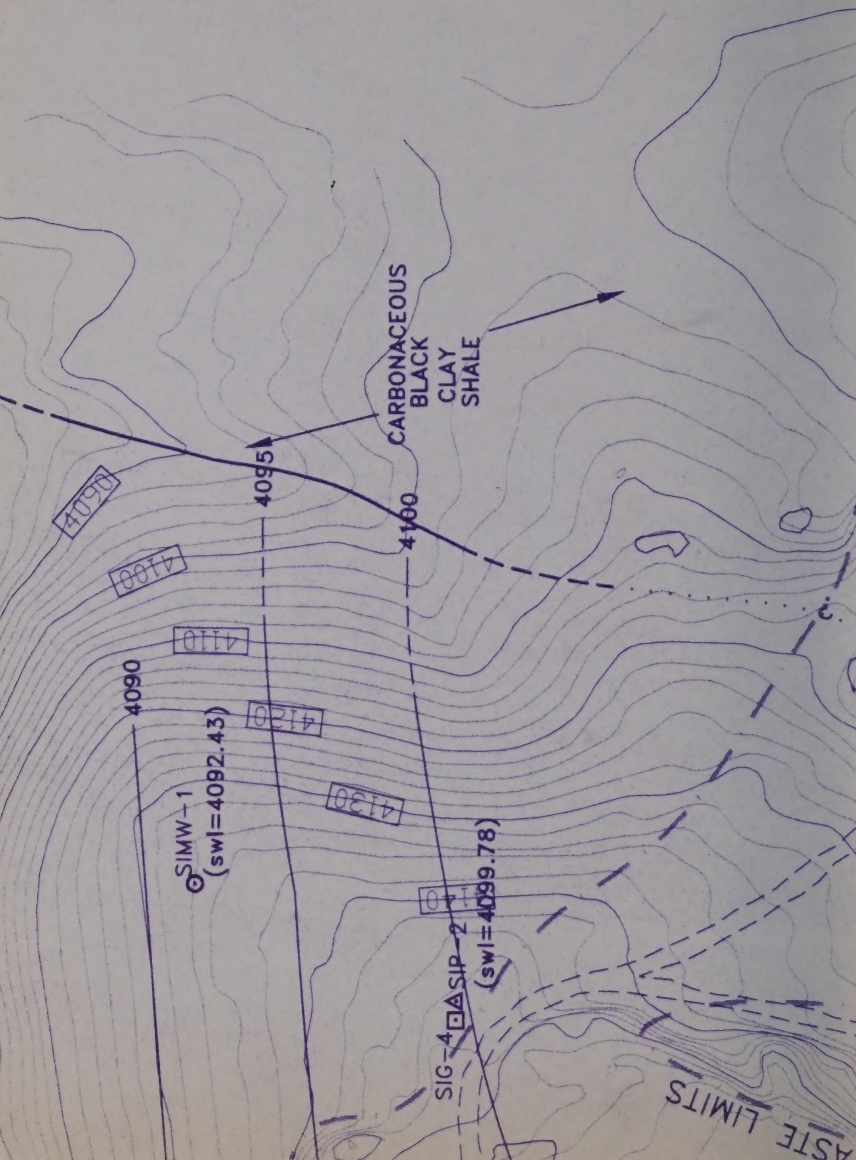
(signature).
Linda Hoelscher





LEGEND

• SI-1	test boring (plugged)
▲ SIG-1	landfill gas monitoring well
◻ SIP-1	piezometer, showing static water level elevation
◉ SIMW-1	ground-water monitoring well, showing static water level elevation
---	water table contour; interval two feet
---	contact of carbonaceous grey clay shale overlying sandstone, siltstone and shale; where obscured; dotted where uncertain
topographic contour interval = 2 ft	
groundwater measurements from 11/4/97	



CARBONACEOUS
BLACK
CLAY
SHALE

SIMW-1
(swl=4092.43)

SIG-4 SIP-2
(swl=4099.78)

WASTE LIMITS



LEGEND

test boring (plugged)
landfill gas monitoring well
piezometer, showing static water level elevation
ground-water monitoring well, showing static water level elevation.
water table contour; interval two feet
contact of carbonaceous grey clay shale with overlying sandstone, siltstone and shale; dashed where obscured; dotted where uncertain
contour interval = 2 ft
measurements from 11/4/97

RECEIVED

FEB 26 1998

MONTANA
DEPT. OF ENVIRONMENTAL QUALITY
COMMUNITY SERVICES BUREAU



FEET

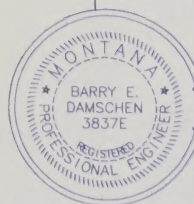
0 50 100 200

PROJECT TITLE

SANITATION INC.
Lewistown, Montana

SHEET TITLE

Site Plan



D&A

Damschen & Associates, Inc.

CONSULTING ENGINEERS

2030 11th Ave., Suite 11
HELENA, MONTANA

JOB/ACAD NUMBER: 95-53
DRAWN BY: B. LLOYD
APPROVED BY: B. DAMSCHEN
CHECKED BY: B. SIEGMUND
DATE: AUGUST, 1996

#	DATE	REVISION
1		
2		
3		
4		

SHEET NO.

1

of 1